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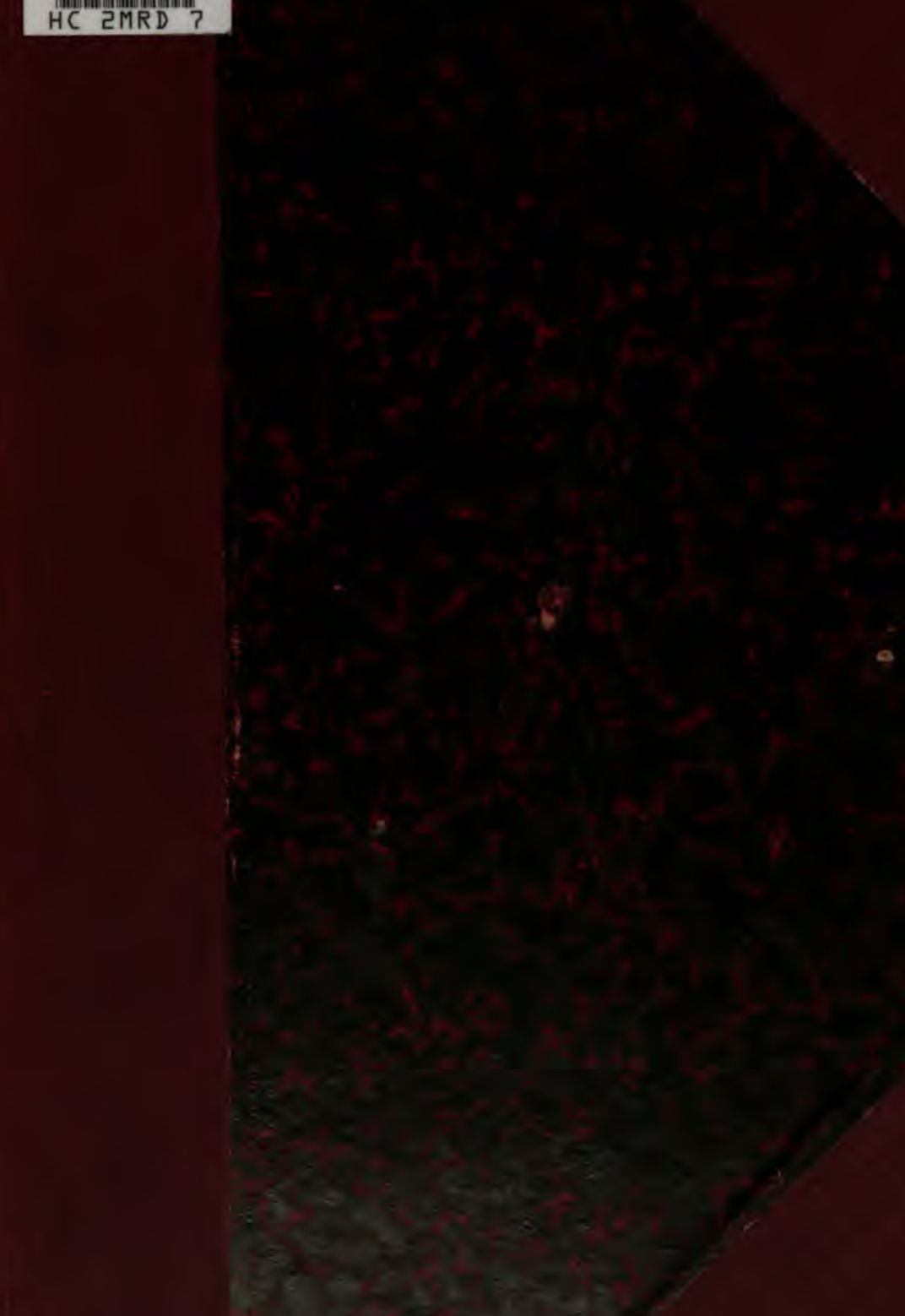

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PREFACE

The Public Lecture Course, consisting of lectures delivered every Saturday afternoon during the year by members of the various faculties of the University of Pennsylvania, continues to attract large and interesting audiences. The secret of this seems to be that these lectures contain the best thought of men who for years have been pursuing special lines of investigation.

It is with pleasure, therefore, that this volume, which is the fourth in the series, is presented to the reading public.

It may be added that the early appearance of this volume is due to the kind and generous support of Henry Reed Hatfield, Esq., of the Class of 1878 College. It is another evidence of his devotion to the educational work of his Alma Mater.

WHY OUR TAXES ARE RISING

By Ernest M. Patterson
Assistant Professor of Economics

Most of us are very strongly impressed with the fact that our taxes are rising. We hear and read a great deal about new forms of taxation and higher rates on old forms, while those of us who are assessed directly know that we are paying larger amounts each year. As a result our convictions on the subject have become very strong and we protest or philosophize according to our various dispositions.

Probably we have exaggerated the extent of this increase. Not long ago an enthusiastic Congressman, whose name, if mentioned, would be recognized by all of us, delivered (or at least received leave to print) an address. His theme was the extravagance of the Democrats, and he endeavored to show that during the last few years there had been placed on the country new burdens amounting to $7.50 per capita. This sum was ascertained by him, however, in a very peculiar manner. To $2 per capita of special war tax—an income item—he added 30 cents per capita to be expended on Alaskan railroads, 50 cents per capita for flood control, 20 cents per capita for a nitrate plant, 90 cents per capita to be received from an income tax, and so on through a long list. Governmental receipts and governmental expenditures were added together by him with a cheerful disregard of common sense and with no appreciation whatever of the ludicrousness of his method. The speech was distributed widely among a trusting and no doubt admiring constituency.

Doubtless none of us would make so glaring a mistake as did this Congressman. Heavy as our burdens seem, none of us combines his income and his expenditures in order to ascertain the cost of living.

Nevertheless our tax burdens are increasing and to such an

extent that it is imperative to find the causes. In 1913 our federal government imposed an income tax whose rates have just been increased to 2 per cent on all incomes in excess of a fixed minimum, with an additional graduated tax on large incomes which is as high as 13 per cent per annum on incomes in excess of $2,000,000. At the same time, Congress also provided for a federal inheritance or "estate" tax with rates ranging from 1 per cent on small estates to 10 per cent on the amount by which an estate exceeds $5,000,000. Taxes were also laid on manufacturers of munitions and still other burdens were imposed.

In our own state—Pennsylvania—there have been no recent changes of importance, but according to newspaper reports the state funds are now very low and more taxation in the near future seems probable. If it does not come our experience will be quite different from that of other states. Massachusetts, Rhode Island, New York and New Jersey at once come to mind in this connection. Each of them has recently been searching for additional revenues.

In local affairs the same situation confronts us. Our own city councils are searching for new sources of revenue and at the same time are seriously considering an increase in the rate of taxation on real estate from $1.50 per $100 of assessed value to an amount much higher, now estimated at $1.75 or $1.85. Nor is the experience of Philadelphia unusual. All of the large cities and most of the smaller ones are having similar and in many cases more serious problems.

We have suggested that the actual increase of our taxes may be less than the apparent increase. This is probably true and we may conveniently divide our discussion into two parts, dealing first with the reasons for such increases as have occurred, and second with increases that are apparent rather than real.

It seems almost a truism to say that increased taxes are due to increased governmental expenditures. Taxes are imposed for the purpose of getting funds to spend. More taxes must be due to greater spending. This much is simple, but an examination of the extent of these increases and the reasons for them

will help us to appreciate or condemn more intelligently. Also it may help us to reconcile ourselves more fully to the burdens or even to view some of the increases as an advantage rather than a curse.

In 1800 our federal expenditures were $2.04 per capita and in 1810 only $1.17. By 1850 this had increased to $1.76, by 1890 to $4.75, by 1900 to $6.39, by 1904 to $7.50 and by 1916 to nearly $11 per capita. This is, of course, for federal expenditures alone—state and local expenditures are in addition.

Such a growth seems startling, especially since we have given the items in per capita terms, but before discussing them further, the facts regarding state and local expenditures should be noticed. The information available is less complete than for the federal government, but the Census Bureau estimates that in the year 1903 the expenditures of our states were $2.30 per capita and in 1913 were $3.95 per capita, an increase for the ten years of 71 per cent.

Statistics are lacking for the same sort of comparison of the growth of municipal and other local expenditures. We may, however, word our comparisons differently, giving the absolute amount of expenditures rather than the per capita figures. The years 1903 and 1913 are chosen because they illustrate well the modern tendency and because more complete information is available for them than for other years.

	1903	1913	Per Cent Increase
Federal	$616,739,000	$952,600,000	54.5
State	185,764,000	382,557,000	105.9
County	197,365,000	385,181,000	95.2
Incorporated places of 8,000 and over	551,234,000	1,119,843,000	103.2
All other civil divisions	222,082,000	444,165,000	100.0
Total	$1,773,186,000	$3,284,343,000	85.2

An increase of 85.2 per cent in ten years is large enough for serious concern. A part of it is due to the increase of popula-

tion, and the rate of increase would be less if given in per capita terms; but the increase of population may itself be a reason for serious thought. This would seem to be especially true if those are right who fear heavy immigration into the United States at the close of the European War.

Before going further we should attempt an estimate of the total tax burden resting on the American citizen. The situation may be shown by combining the federal, state and local burdens in a few communities. This can be done only in an approximate manner. Just how much of the cost of operating the federal government is paid by any particular person or group cannot be ascertained. In the year 1915 our customs receipts were $209,000,000, but how much of that sum you or I paid in higher prices for sugar, silk and other commodities cannot be determined.

Any estimate must therefore be very arbitrary and very inaccurate, but it will indicate in a vivid manner the amount of the burden that is being carried. If it be assumed that the burden of taxation has been divided evenly among us, what is the burden of each?

We may take a resident of Philadelphia for the year 1913 for the first illustration. Remembering how arbitrary our assumptions are, we may observe that his share of the federal burden was $9.81, of the state $3.71 and of the city of Philadelphia, $26.54, a total of $40.06. This, it must be remembered, is not per voter or even per adult, but is the amount attributable to each individual in our city in 1913. Multiplying by five, the number usually taken to represent the size of the American family, we find the burden on the average Philadelphia family was slightly over $200. Again it may be observed that there is no such thing as an average Philadelphia family, but this way of stating the situation makes the size of the burden impressive.

But we of Philadelphia are not so heavily burdened as people of some other cities. Local expenditures are usually, though not always, less in smaller communities; but in the larger places the amounts are large. In Chicago the total for all three

classes of expenditures is $36.48 per capita; in New York City $63.52; in Omaha, Nebraska, $94.98; and in Pasadena, California, $101.93, or over $500 per family. To be fair, attention must be called to the fact that in each of these cities a part of the sums named were capital outlays, some of which will in the future yield a revenue. In 1913 $55.54 was thus spent by Pasadena, but there is left $56.39 per capita, or over $280 per family. Also it must be observed that these items are for a particular year, which means that in some communities the amounts were much heavier than usual. This latter difficulty may be largely avoided if we take the averages for the entire country as given by the United States Bureau of the Census. The per capita governmental cost payments for federal, state and local purposes in all communities, both urban and rural, was $30.56, or $152.80 per family of five people.

Still another qualification must be mentioned. There is a certain amount of error in the figures given, due to payments made by one governmental body to another, especially from local to state governments and the reverse. The late Prof. E. V. Robinson, of the University of Minnesota, attempted to allow for these various difficulties when he estimated $30.32 as the average per capita cost of government in Minnesota in the year ending August 1, 1910. Prof. Plehn, of the University of California, estimates "the average annual per capita expenditures of all branches of government in the United States exclusive of our insular possessions, for years like 1911 or 1912, as not less than forty dollars and not more than forty-five dollars." These last figures indicate an average per family of from $200 to $250 for the entire country. Estimates are thus seen to vary widely, but in every case the totals are large.

If these figures be compared with the average money income per capita and per family in the United States, we have the information for some interesting conclusions. One of our best authorities[1] estimates this income as $332 per capita, which is $1,660 per family. A comparison with the tax burden just mentioned shows that about twelve or thirteen per cent of this

[1] W. I. King, "The Wealth and Income of the People of the United States," p. 235.

average family income is taken for governmental purposes. Needless to say, most incomes are far below the average and many families are paying far more than the average tax.

These sums are large, in fact very large, but they are not necessarily a cause for alarm. We pay taxes because we have decided that we shall get better results by conducting many activities through our government than by managing them ourselves or by hiring other individuals or corporations. For example, we think it better to pay taxes to cover the expense of the police and fire departments, the paving of the streets and the delivery of our mail, than to perform these duties, each for himself, or to employ private individuals or corporations to do them. In some cases we may have gone too far and in others not far enough in government ownership and management. But we have at any rate made the decision in many lines of business and are frequently considering what to do in other cases as they arise.

The test to be applied then is two-fold. First, our ability to pay the taxes—the amount of income we possess from which payment can be made. Second, the quality of the service we receive from the government in return for our money. If we secure more and better goods and services through governmental channels than we could get at the same price from private sources we have little or no ground for complaint.

Next in order is an enumeration of the reasons for this increase in expenditures and the consequent growth in taxation. First in the list is the rise in prices. This needs but brief mention. Since 1896 prices and wages have been advancing with regularity. Employees of the government must have increased pay and materials must be purchased, even though the prices have risen. From 1903 to 1913, the years used in the previous comparisons, the increase was fully ten per cent, and since the outbreak of the European War the rise has been still more rapid.

Second is the dishonest use of public funds. Letting of contracts to favored bidders, "pork barrel" appropriations and other objectionable practices are illustrations. More is heard of them in connection with the federal and state governments

and the larger cities, because of the large amounts involved, but a greater proportionate amount is probably to be found in the smaller governmental units, because among them there are poorer systems of accounting and less publicity with consequently greater opportunities for dishonest officials.

Third is the lack of proper accounting methods. Comparisons between different state and city governments are almost impossible, while those between the various departments of the same government are often equally difficult. Poor accounting systems encourage extravagance and conceal dishonesty.

Fourth is the absence of budget systems. A governmental budget may be defined as "a comprehensive plan for financing any undertaking submitted by the competent authority for the consideration of the ultimate money voting power." It may range in its comprehensiveness and complexity from a brief statement of prospective receipts and expenditures to an elaborate explanation of what has been done and what it is proposed to do with a detailed comparison of past and estimated future costs. It is usually submitted by the executive department, which formulates many of the policies and executes all of them, to the legislative body which controls the disposition of the funds. Our federal government has nothing worthy of the name budget, and few of our states are very much better. Some of our cities have in recent years made rapid advances in this regard. Without an adequate budget statement, the efficient use of public funds is almost impossible.

Growth of public debts with their burden of interest and sinking fund charges is a fifth factor. Europe's post-war interest burden will be enormous. Before the war the British government was spending about $1,000,000,000 per year. Interest on her debt today will take fully one-half of this amount and if an attempt is made at repayment, the annual burden will be still larger. In many other countries the burden will be as bad or worse.

But there are conditions nearer home that are similar although not so acute. Interest on our federal debt is now about $23,000,000 per annum—a relatively small burden. Pennsylvania has

no debt. Philadelphia, however, is rapidly adding to its obligations and has been doing it very heedlessly. Although not large compared with that of New York City, much of it has been accumulated for meeting expenditures that should have been financed through taxation—a remedy that apparently will soon be applied. Several years ago our local Bureau of Municipal Research estimated that if our revenues continued to increase as they had been doing for several years and if our municipal debt should continue to grow as it had been growing for several years, by 1928 all of our revenues would be needed to meet interest and sinking fund charges on the debt.

New York State and New York City furnish illustrations of excessive debts, that of the latter being greater than our federal debt. So serious has the situation become that many attempts are being made to check the evil. New York City was compelled in 1914 to make certain radical alterations in its financial methods, and among the states, Massachusetts has been a leader in enacting legislation requiring the municipalities of the state to reform.

A sixth factor of importance is expenditures for military purposes. This applies chiefly to national governments. Just how much is thus spent is very hard to determine because our public reports are very hard to analyze and also because many such charges are indirect. For example, our War Department performs numerous duties that are not military and one does not know how to distribute many of its expenditures between war and peace functions. The cost of constructing and operating the Panama Canal is another illustration. Just what fractional part is for military as distinct from commercial purposes is hard to say. A prominent accountant[1] estimated that in the year 1915 more than $409,000,000, or over forty-one per cent, of our $962,000,000 of United States federal expenditures were for war as distinct from peace functions. Another authority[2] placed the percentage in 1902 as over seventy per cent. Even

[1] Harvey S. Chase, *The American Economic Review*, March, 1915. Supplement, pp. 186 ff.

[2] C. J. Bullock, *Political Science Quarterly*, Vol. XVIII, pp. 97–111.

the first estimate overwhelms one—over forty-one per cent for war, compared with less than fifty-nine per cent for peace.

Seventh is the lack of proper governmental organization. Any one who is familiar with the routine in the official departments or who has seen a diagrammatic representation of the situation can appreciate this weakness. A chart of many of our governmental structures shows a confusion that is appalling. Duplication of functions, lack of correlation, and absence of power and responsibility are everywhere apparent. This is true of every branch of government. That Philadelphia is no exception will be realized by any one who examines a chart recently completed by our Bureau of Municipal Research. A few notable exceptions to this difficulty are to be found, but the trouble is still almost universal. Positions and salaries are duplicated, offices are needlessly scattered, different departments give conflicting orders for the same work and standards of compensation are lacking. The Efficiency and Economy Committee of the State of Illinois in 1915 estimated a probable saving of $1,000,000 per year chiefly through an improvement in the general organization of the structure of the state government.

Eighth may be named the growth of government ownership and control. There is much dispute over the wisdom of this movement, but at present it is on the increase. The growing density of population, the gradual exhaustion of our natural resources, the growth in the size and power of our large corporations, together with the pressure of a period of rising prices, are influences of importance in this connection. We are demanding that our public utility corporations charge us no more for their services than enough to yield them a fair return on the value of their property. We are not quite sure exactly how much is a fair return and we are very confused over how to determine the value of the property, but we are wrestling with the problem and making progress toward its solution. In the meantime many communities are constructing and operating their own plants for water, gas, electricity and transportation. Two factors are involved—the price charged and the quality of the service. Opponents of public ownership

assert that private corporations furnish better service—a contention that is obviously true if you allow enough exceptions—and the number of exceptions is rapidly on the increase. Fully as important, however, is the price, and in many cases the gain through a reduction in price might easily offset a very considerable deterioration in service.

The movement has two aspects. One is the pressure it is placing on public utility corporations. The Interstate Commerce Commission and our various state commissions are forcing directly and indirectly better service and lower rates. We have had a recent illustration in the reduced rates for electric lighting in Philadelphia, a saving to many of us of about twenty-five per cent in the cost of electric lighting.

The other aspect is the increased public expense involved. Governmental control through commissions and otherwise is an expense. The returns may be more than the cost but they are chiefly indirect and hence unappreciated, a fact which goes far to explain much of the present criticism of public commissions. If instead of public control we have public ownership, expenditures are increased still more. But under proper management the receipts should at least equal and perhaps exceed the expenditures yielding the government a profit. When this is the case the additional expense is apparent, not real.

Growing density of population adds to our problems and therefore increases our expenditures. The need for better sanitation, more efficient police and fire protection, with better streets and roads for quick transportation are illustrations of this ninth cause.

Still more could be added, but time forbids more than one—the tenth in the list. The others have been important, but this is much more so. Of the nine already mentioned, a number may be minimized or removed. Prices may begin to fall, graft will be lessened, better accounting systems will be installed and improved budget systems adopted. Governmental structures will be improved and better methods of managing public debts will be introduced. But still the costs of government will continue to increase.

This tenth influence may be illustrated by reference to a recent study of taxation in Milwaukee. From 1904 to 1914 the per capita tax burden for city purposes alone rose from $13.65 to $22.65, an advance of $9 per capita. At the same time there was an increase of $3.30 per capita in the cost of county government.

An examination of these changes is of interest. There were inefficiency of management, poor accounting systems and the other usual difficulties which we have mentioned, but there were other features much more important. Of the $3.30 per capita increase in the cost of county government, $2.48 was used for entirely new activities. Good roads took $1.33, an improvement which helped the farmer in transporting his products to the centers of population. The new juvenile court took 8 cents per capita and other new courts, where fees are no longer charged, took 12 cents. New parks took 14 cents, a new school of agriculture 13 cents, two new sanatoriums for tubercular patients 17 cents, and mothers' pensions 5 cents. These are all new county functions. But old functions are costing more than ever before—partly because of a higher price level, but partly because the public demands a better and more complete performance of these functions than in the past. More people are being cared for, and better cared for, in the almshouse, the county hospital, the children's homes and the insane asylums. Old soldiers are getting three times as much help as ten years ago. New courts have been created and the sheriff has more deputies. Summarizing, we may say that new services have taken 65 per cent of the increase, while 35 per cent is due to the increased cost of old services. The largest part of the increase in this one county went to good roads, viz., 40 per cent. The care of the poor, sick and insane come next with 26 per cent, and the cost of the courts, the house of correction, the sheriff's office, etc., was 16 per cent.

A similar situation is shown in Milwaukee city financing. Of the increased cost, 27 per cent is due to growth in population, 19 per cent to the introduction of new services and 54 per cent to the increase in amount and quality of old services and

to wage increases. The schools do more for the public than those of ten years ago. Trade schools, continuation schools, playgrounds, social centers, correction of defective hearing, eyesight, teeth and digestion, free books, and teachers' pensions are excellent but expensive. Parks, boulevards, libraries and museums; more and better paving, new bridges and viaducts; natatoriums and bathing beaches; better collection of rubbish and garbage; more effective fire prevention, baby saving campaigns, and devices to increase health and prevent or cure disease are among the important items.

Two significant conclusions may be drawn from this incomplete but suggestive list. One is the rapid increase of duties performed by our governments. Milwaukee has been used as an illustration, but only because the facts there have been analyzed in a manner convenient for our use. Otherwise Philadelphia or Pennsylvania or the United States would have done as well. The more we have, the more we want. The more our governments do for us, the more we want done, and when we become accustomed to a certain service, we are loath to do without it. "There seems to be little or no cause to hope that the sum total of human wants will ever be sated," and there is just as little reason to anticipate that the demands for government service will lessen.

These demands for increased government service are appearing, as we have noticed, in (1) a better performance of old services and (2) the introduction of new services. This is so common a phenomenon that the German economist, Adolph Wagner, has formulated a "law of the increase of state activities:"

> Comprehensive comparisons of different countries and different times show that, among progressive peoples, with which alone we are concerned, an increase regularly takes place in the activity of both the central and the local governments. This increase is both extensive and intensive: the central and local governments constantly undertake new functions, while they perform both old and new functions more efficiently and completely.

There is no reason for discouragement in this situation. Just so long as we can afford to pay our governments for these serv-

ices and just so long as we turn over to them only such functions as they can perform for us better than private individuals or corporations, we need feel no concern. As time passes and the pressure of taxation makes itself more clearly felt, we shall demand better and better returns for our money, a greater amount of economy and efficiency. If we get efficient service that we can afford, why should we complain?

The second of our conclusions is even more encouraging. The increased expenditures are largely along progressive lines. Graft and inefficiency are only too common, but the tendencies are encouraging. The bulk of the increases, whether for old or new functions, have one or both of two characteristics. They are designed, like better roads, to assist business and commerce and thus ultimately to add to the wealth and presumably to the welfare of the community; or, like sanatoriums, mothers' pensions, playgrounds and baby saving campaigns, they have social welfare as their immediate aim. Nothing could be more encouraging. Taxes that we can afford are a blessing, even though well disguised, when the funds are put to such excellent uses.

Thus far reference has been made only to tax increases that are real. Some, however, are apparent rather than actual and they should receive brief notice. Taxes to which we have become accustomed rouse our resentment less than new ones and taxes paid indirectly rather than directly or by some one else than ourselves, are never so troublesome as those paid directly and immediately from our own pockets. Certain readjustments in forms of taxation and shifts in tax burdens are now being accomplished and the process is painful, even though there is often no real increase in the total amounts collected.

There are various theories as to the manner in which tax burdens should be distributed. Per capita taxes have largely disappeared, existing now chiefly in the well-known poll tax. Taxing each individual or each adult or each voter in the community the same amount is both impracticable and unfair. Many residents of Philadelphia could not pay the $40 per capita

or $200 per family which was mentioned above as the average governmental burden in this city. Besides, such an adjustment would not seem equitable. Public opinion supports the view that there should be some relation between the amount of the tax and the financial ability of the taxpayer.

But ability to pay is not easy to measure. As already observed, a mere per capita apportionment is unfair, and yet accurate tests of ability are hard to find. Three important ones are used. One is the amount of goods consumed and is illustrated by the tariff. The more one consumes of imported goods on which a customs duty is levied, the more he pays through higher prices for the goods. But this is not entirely equitable. In order to secure a large and dependable income from this source, governments must levy customs duties largely on those goods that are used in quantities and very regularly—in other words, the necessities of life. Ignoring the question of protection to American industries—a problem not now under discussion—the conclusion to be drawn is almost obvious. The rich man pays more than the poor man, but his payments are by no means proportioned to his ability.

A second test is the amount of property owned by the taxpayer. The owner of property pays an amount proportionate to his holdings. This seems better, but there are many people with large incomes who own very little property or who have it in a form easily concealed from the assessor. An unjust situation thus develops. As time passes it becomes more and more acute and other tests of ability are sought.

A third test is the taxpayer's income. This test is being applied more and more frequently, appearing in our inheritance taxes and in our income taxes. A large number of our states tax inheritances, and federal legislation for the same purpose was enacted by Congress at its last session. A few of our states are using the income tax, Wisconsin and Massachusetts being the most notable examples. Other states, including New York, are seriously considering it for state or for local purposes or for both.

These inheritance and income taxes go a step further than

property taxes. If it be admitted that taxes should be paid in accordance with ability and that income is one good test of ability, another question arises. Does ability increase with the same rapidity as income, or more rapidly? Will a man with an income of $100,000 feel a ten per cent tax which takes from him $10,000 as much as a man with an income of $1,000 would feel the loss of 10 per cent of his income? Public opinion on this is reflected in our laws, which in most cases provide for a higher rate on the large incomes and inheritances than on the small. A man who loses $10,000 from a total of $100,000 still has $90,000 as a protection against starvation and will have to deny himself none of the necessities or even the ordinary comforts of life. The man who pays $100 from his $1,000 income has but $900 left and may suffer real privation.

Another change is observable. For years we have been smiling at what we have called the vagaries of the single taxers and the socialists. Today most of us find ourselves still in disagreement with their programs as a whole, but we make some important concessions. Although not ready to take all of the value of land through higher taxes, we are admitting that landowners must bear a larger part of the burden than heretofore. Some of us definitely concede that land values are a social product. Others of us still dissent, but nearly everywhere taxes on land are being raised. In some communities, as in western Canada and in two cities of our own state, Pittsburgh and Scranton, this change is being accompanied by a reduction of the tax on improvements. A New York City committee has just reported against such a plan, but a strong minority of the committee filed a favorable report.

This is also a movement toward heavier direct taxation. In so far as these taxes displace other sources of revenue there is no actual increase in the amount paid in the community. In so far as they supplement the old taxes there is, of course, an addition to the burden.

Readjustments are usually painful and the ones we are discussing are far from being exceptional. That there are many complaints need not cause surprise, for many are actually

injured during such changes and many others think they are, which is almost as bad both for them and for the rest of us.

This analysis of our tax increases has been general rather than specific. Little reference has been made to particular local problems and no suggestions have been offered for their solution. Such considerations are outside the scope of our subject. Philadelphia's difficulties, like those of other communities, are intricate. Those who most grapple with them have a harder task than many realize, for years of improper financing have created a serious situation. Before expressing many opinions, long patient study should be given to details. General principles, though of the best, cannot be ruthlessly applied in a given case, yet a knowledge of such principles and a conscientious endeavor to apply them as fully as is practicable are important. That the necessity for this is becoming apparent is evidenced by the striking statement recently made before our City Councils by the chairman of its Finance Committee. If the procedure outlined by him can be adhered to we shall have taken one—though only one—important step toward the solution of our difficulties.

THE ASTEROIDS

By Samuel G. Barton
Assistant Professor of Astronomy

The conviction that there must be law or harmony in nature is very old. Everything was thought to be as it was because for some reason that was the best way for it to be. Early, attempts were made to formulate general theories of the universe. Various ideas as to perfect numbers and perfect ratios were invoked to harmonize the distances and motions of the heavenly bodies. One familiar example of these is the Pythagorean doctrine of the music of the spheres. On the present occasion it is interesting to note that the Pythagoreans made the system to consist of ten bodies revolving about a central fire called Hestia. Ten being considered the perfect number it was necessary to imagine a new body Antichthon or counter earth to make up the necessary number. This body and Hestia being invisible because always on the opposite side of the earth.

It was with very much the same spirit and the same abstract conceptions that Kepler, born 1571, attacked the same problem of harmonizing the planetary motions. The laws which he discovered have made him immortal, but his work is a combination of the sublime and the ridiculous. One of the curiosities of his work was his discovery that if we use a sphere of radius equal to that of the orbit of Mercury and circumscribe a regular octohedron about it and then a sphere upon the octohedron the radius of this sphere will be that of the orbit of Venus. Continuing the process using each of the five regular solids in a given order we get the radii of each of the planetary orbits. The results agree but roughly with nature, but Kepler said he would not take the Electorate of Saxony in exchange for the discovery. In trying to work out his theories Kepler noticed that the distance between Mars and Jupiter

was disproportionately large and he placed an imaginary invisible planet between these two. He did the same between Mercury and Venus, but did not retain it. His suggestion was well received, but of course could not be verified. In 1772, Bode announced the discovery of Titius, commonly known as Bode's law. The law may be stated: write a series of fours and to the second add three, to the third add twice three and so on, adding to each four twice what was added to the preceding, then dividing the sums by 10 we have the following series: 4, .7, 1.0, 1.6, 2.8, 5.2, 10.0, which numbers represent the distances of the planets from the sun in terms of the earth's distance, provided that we omit from consideration the fifth one, 2.8, or insert a planet at that distance. This law agreed with nature very closely. In 1781, the planet Uranus was discovered accidentally by Herschel. Its distance was found to be given by extending Bode's law one term. No one had previously suspected its existence. The suspicion of the actual existence of a planet between Mars and Jupiter, too faint to be seen, was thus rapidly increasing in strength. Nothing definite was done, however, until September, 1800, when a company of six astronomers met and decided to organize a search for it. The Zodiac was to be divided into 24 parts, one for each hour, and 24 astonomers were each to take one of these parts. Piazzi of Sicily was selected to be one of these, but he discovered the planet before knowing this fact. In observing the stars, as he had been doing for nine years, in order to make what we now know as his star catalogue, he found a star which moved. From the date of its discovery, January 1, 1801, until February 11th, he observed it carefully. He was then obliged to stop because of illness. On January 23d he sent word to Bode at Berlin, but it did not reach him until March 20th. By that time the planet was too close to the sun to be seen and would remain so until September. Where to look for it then, who could tell?

This may be strange, that 115 years after the discovery of the law of gravitation it was not possible to predict the motion of a planet for a few months in advance, yet such was the case.

Under certain conditions or with certain assumptions the orbit of a heavenly body had been worked out. But the conditions and assumptions did not apply here. Most of the astronomers tried to find out where Ceres (for so the planet was named) would be in September, but failed wholly. As no such planet had appeared before, the need of the solution of the problem had not been manifest. It had been a theoretical problem; now it was a practical one. Gauss had some passing thoughts upon the problem in September, which he says might easily have been passed over and never have been developed had it not been for the appearance of Ceres at this time. As it was, he took up the problem and, needless to say, solved it. He predicted its position and Ceres was seen there on the first night when search could be made, December 7th. Even then clouds interfered and the planet was first properly observed December 31st by Von Zach. Olbers found it the next night. On March 28th Olbers in looking at this same region noticed that there was a star there which had not been there when he found Ceres. It was another planet, Pallas. Gauss computed its orbit also.

The problem as Gauss himself states it was "to derive the orbit of any heavenly body without any hypothetical assumption, from observations not embracing a great period of time and not allowing a selection with a view to the application of special methods." In the case of Ceres it had been observed only 41 days and had moved but three degrees. At this time Gauss was but twenty-four years old. His methods were published in 1809 in his work known as "Theoria Motus." The methods of Gauss set forth in this epoch-making work, with a few improvements, is still the best known and usual method of solving the problem. Indeed, but one method, that of Laplace, differs from it in its essential principles. In this work Gauss develops and applies the method of least squares. Astronomers can but rejoice that Ceres was lost; for had we lost the work of Gauss by not requiring it, our loss would have been very great.

It is of interest to note that the philosopher Hegel published

a treatise "on the planetary orbits," as his inaugural dissertation just at this time. It is a sharp and even discourteous criticism of Newton's astronomy and in particular ridiculed the idea of looking for another planet because of a missing term in a series. He suggests in place of Bode's series one of his own, an adaptation of one given in Plato's Timaeus. It was published August 27, 1801, whereas the planet had been found January 1st. Apparently Hegel was still in ignorance of its discovery. He suffered at the hands of his critics for this unfortunate and ill-advised discussion of this subject.

Ceres was found to fulfill the requirements of Bode's law. There was apparently no need for further search; but as we have seen Olbers had found another planet as a result of his search for Ceres. This discovery was of course a surprise and new theories were required to explain it. Olbers himself advanced a very plausible one that an original planet had exploded and that the bodies found were not the only ones. He thought that all such bodies must pass through the point where the original explosion occurred and that search should be made at the points where the orbits of Ceres and Pallas intersected. Acting upon this suggestion, another was found in 1804 and Olbers found one in 1807, thus showing that the suggestion was not very fruitful. No other was found until 1845. As these planets looked much like stars, Herschel proposed that they be called asteroids. Minor planets is another common name for them, but objectionable it seems to me, as major planets do not include all others, but the outer four only.

There is but one way to distinguish between an asteroid and a fixed star and that is by the fact that an asteroid changes its position slowly. If one had a map showing each star in its position it would be an easy matter to compare the sky with the map and thus detect the presence of a strange star. Such a stranger might be a variable star or an asteroid. If motion were detected, it would be the latter. For the purpose of asteroid observers we now have the Wolf-Palisa charts showing the stars brighter than the sixteenth magnitude near the

ecliptic. The early observers had no such charts, and in order to detect asteroids they had first to spend much time in making the map. As all the asteroids are faint, one only appearing at times faintly to the naked eye, this was a great undertaking indeed. For this reason, after the early discoveries, few searched for asteroids. The importance of such charts was made manifest and great star maps were made by the Berlin Academy from 1830 to 1859. With charts the search became easier. The fifth asteroid was found in 1845, three more in 1847 and since that time at least one each year. In 1850, 13 were known; in 1875, 157. In 1891 Wolf found the first asteroid by the application of photography, No. 323. Since that time the old method has given place entirely to photography. When a region of the sky is photographed, the stars impress themselves upon the plate as points of light, but an asteroid, because of its motion, impresses itself as a short line and is thus easily distinguished upon the plate. The important object upon the plate is the asteroid, which is usually very faint, especially as its light has been used in making a line. To give the asteroid the advantage our countryman Metcalf moved the photographic plate at the rate at which the asteroid moves as nearly as possible and thus gets all the light from the asteroid collected at nearly the same point on the plate while the stars make trails. He states that this method is about seven times as efficient as the use of charts. He says that he would undertake to discover a new planet upon any clear winter night. With these methods the discovery of asteroids has been very rapid. There are now known 868. At first each asteroid was given a name, and a symbol as well, like the principal planets. When they became more numerous the symbols were dropped and the asteroids given consecutive numbers as well as names. At first almost all the names were feminine, but now with the great number it is no small problem to find a new name and there is more latitude. In order to predict the position of a planet it is necessary that it be observed at least three times. Until it has been satisfactorily observed it is not given a name or a number, but is merely designated

by the year of discovery, followed by two letters, as 1915 WY. A considerable number of those discovered are lost again for want of observation. Of those found and numbered before 1901, 23 have been lost. Of those found before 1911, 62 have not been observed except near the time of discovery. Sometimes those which are lost are recovered by accident. A remarkable case occurred recently, for the asteroid 1915 WJ was found to be identical with 99 Dike which had been found in 1868 and not seen since. It was the farthest back of any lost; 132 now holds that distinction.

The discovery of the first asteroid by Piazzi was a very important event and we have treated it as such. He discovered no other. Some of those now working, whose names I have scarcely mentioned, have discovered nearly a hundred. The discovery of an asteroid is now a matter of very small moment indeed. The newspapers, however, occasionally hear of such a discovery of a planet and treat it as though it were a discovery equal in importance to the discovery of Uranus or Neptune. Certain ones have been very useful to astronomers and there are doubtless others yet to be discovered. Many, on the other hand, have not as yet proven so, although they may do so still in unexpected ways.

We will first consider the asteroids which are important as individuals and then treat them collectively. Ceres, Pallas, Juno and Vesta are important because they were the first to be discovered. They are also the brightest and largest of the group. Ceres is the largest, but Vesta the brightest. The orbit of Pallas has a greater inclination to the plane of the ecliptic, 35 degrees, than has any other asteroid whose orbit has been well determined. 1906 WD, however, has an inclination of 48 degrees. The orbit which is most eccentric is that of (719) Albert. Its eccentricity is .54. So great an eccentricity implies that its greatest distance is over three times its least distance from the sun. When nearest to the sun its distance is only 1.19 times the earth's distance. It therefore approaches the earth closely and is then far within the orbit of Mars. It is, however, a very faint object. It would be of about the

tenth magnitude when nearest. Its average magnitude at opposition is 17.6. The most distant asteroid is (588) Achilles, at a mean distance 5.25 times the earth's and greater than Jupiter's. 1912 OL, whose orbit is not yet well determined, shows an even greater distance of 5.46. The asteroid closest to the sun is (433) Eros, at a mean distance of 1.46. The next asteroid in number (434) is also the next nearest asteroid, but its mean distance is a third greater than that of Eros. The asteroid which comes nearest to the earth is of far greater importance than any other.

The ratios of the distances of the planets from the sun or from each other are known with the last degree of precision, but in order to know any distance in miles it is necessary that some one distance be determined in miles. In general, the distance of the body nearest to us can be determined most accurately. The moon of course cannot be used. Venus, the planet nearest to the earth on one side, is but .28 units from the earth when nearest, but when it is nearest it lies in nearly the same direction as the sun and cannot be seen because of the strong sunlight. It is only upon those very rare occasions when it transits over the face of the sun that we can see it in this position, and upon those occasions the observation is not satisfactory because of what is known as the black drop caused by the atmosphere of Venus. Beyond the earth Mars is the nearest of the principal planets. At intervals of fifteen years it approaches to a distance of .38 units from the earth. In this case, the brightness of the planet, its phase and color and the fact that the planet has a disc are sources of inaccuracy in the determination of its distance. For these reasons the nearer asteroids, even though considerably farther from us than Mars, were considered better for the purpose than Mars. (7) Iris, (80) Sappho and (12) Victoria were so used. Newcomb assigned these observations a weight of 5 compared with a weight of 3 for Venus and 1 for Mars. In 1898, after these observations had been taken, the remarkable asteroid Eros was discovered. Observations upon it are not attended with the difficulties arising in observations on Venus or Mars, and at times it comes

within .15 units from the earth, which is but little over half the distance of Venus. For these reasons the distance of Eros can be obtained with greater accuracy than that of any other planet, and from this distance as we have said the distance of the earth from the sun or any other distance in the solar system can be obtained easily.

The mean distance of Eros from the sun is 1.46, but as the orbit has the large eccentricity .22, its distance varies between 1.13 and 1.77. Its greatest distance from the earth is twenty times its least. The planet was close to the earth in 1894, a short time before it was discovered. The conditions are such that it will not again approach the earth closely until 1931. Just at the beginning of the year 1901 it was closer to the earth than it will be until 1931, but yet more than twice its least distance from us. At that time a rather elaborate campaign was undertaken by many of the principal observatories of the world to determine the distance of Eros both by photography and direct micrometrical measurement. The final results were published in 1909. The photographs gave as the solar parallax $8''.806 \pm ''.0027$ and the micrometer $8''.802 \pm ''.0036$. The first corresponds to a distance of 92,830,000 miles, with a probable error of 30,000 miles. These values differ but slightly from those previously accepted, but the probable error is less. Doubtless no further effort will be made in this direction until 1931, unless some asteroid is discovered whose distance is less than that of Eros. In 1931 Eros will probably be visible to the naked eye for a few days. At that time there will doubtless be a much more extended campaign and a value of the distance of the sun determined more precise than any now existing.

If now we pass to the other extreme and consider the asteroids most remote from the sun, we find there a group of four asteroids which have orbits near the orbit of Jupiter. These are (588) Achilles, (624) Hektor, (617) Patroclus, and (659) Nestor, in order of decreasing distance. Two asteroids whose orbits have not been well determined, 1912 OL and 1912 ON, belong in this group. This group is known as the Trojan group, since they have been named from the heros of Troy, or sometimes

they are called the Achilles group. It is not, however, the fact that these asteroids lie upon the outside of the asteroid zone which is the chief reason for their importance. It is their relation to Jupiter and the sun.

The discussion of the problem of three bodies in various forms has engaged the attention and energy of astronomers and mathematicians to a very large degree and for a long period. Its general solution has not been obtained in a satisfactory form. Very early in the history of the problem Lagrange pointed out that under certain conditions the problem can be completely solved without approximation. He showed that if three bodies be placed at the vertices of an equilateral triangle and started revolving about the common center of gravity with a given velocity, they would always remain in an equilateral triangle (not necessarily of the same size), and each body would describe an ellipse about the common center. Some of the Trojan group are believed to represent actual examples of this theoretical case. Three of these asteroids are near the point 60 degrees ahead of Jupiter and the other 60 degrees behind. It has been shown with one mass negligible, as is that of the asteroid, the motion will be stable; that is, the bodies would always be nearly in an equilateral triangle, their actual triangle oscillating about an equilateral triangle, provided one of the other masses is at least twenty-five times as great as the third. The sun being 1,000 times as massive as Jupiter, the motion is stable in this case. The period of the oscillation, according to Prof. Brown, must be over 150 years. With these oscillations the motion of the asteroid might appear complicated. Very great interest in the motions of the Trojan group has resulted. Their future motions will give accurate checks upon the correctness of the complicated theories of their motions.

The influence of Jupiter in disturbing the motions of the asteroids is very great. Newcomb computed the mass of Jupiter from the disturbances caused by it in the motions of (33) Polyhymnia.

That the light from the asteroids is not constant has been

claimed from the first. The matter was brought forcibly forward in the observations upon Eros in 1900, for there was decided evidence of variation in this planet. Its light changes regularly by half a magnitude in a period of 5 hours 16 minutes. Numbers 30, 108, 116, 186, 345 also show regular variations and a number of others are suspected. Various things might cause such variations. The asteroids of course have phase differences, but they are so slight as to be negligible. Another suggestion is that these asteroids are double bodies and that the two bodies, which are egg shaped, revolve in the period of variation. Another theory is that the different parts of the asteroid have different reflecting powers somewhat like the land and sea upon the earth and that the variation is caused by such a body rotating upon an axis. The bodies may be thought to be irregular in shape, just like great stones. If so they would present reflecting surfaces of different area as they revolved. No one theory is wholly satisfactory.

Little can be done to determine the size of the asteroids. They are such small bodies that in but very few cases do they present discs sufficiently large to measure. Numerous measures varying widely have been published since the first discovery. Barnard measured four very carefully with the great Lick telescope and his measures have been accepted as the best that can be obtained. The resulting diameters were: Ceres 488 miles, Pallas 304 miles, Vesta 248 miles and Juno 118 miles. The others do not show measurable discs, although some of the more remote asteroids may be larger than Juno. If all of the asteroids had the same reflecting power, or albedo as we call it, it would be an easy matter to get the approximate diameter of each one from these measures and the magnitudes, but unfortunately even these four show widely different reflecting powers. Ceres reflects about 13 and Vesta 72 per cent of the light which falls upon it. This range is the same as that of the other planets. These results are surprising, as one would expect that the asteroids were very similar. Unless the reflecting power of the others is much less than that of Ceres, which is not likely, they must all be very small bodies.

We have little direct evidence as to the mass of the asteroids, for we have no definite knowledge of the size in general nor of the density. If the density is the same as that of Mars, Ceres (the largest) would have a mass 1/5800 as large as the earth. This is probably larger than the actual mass. The attractive effect of any single asteroid is too small to measure. The most pronounced effect of the attraction of the combined mass would be a motion in the perihelion of Mars. No such effect is sufficiently large to measure. For this reason we can say that the combined mass does not exceed one per cent of the earth's mass. This estimate of course includes the undiscovered as well as the known asteroids. Those known probably are but a small part of it.

Of course we do not know how many asteroids there are which have not been discovered. Discovery continues without abatement, but the new discoveries are increasingly faint objects. The size probably ranges from Ceres down to impalpable dust, so that the number of very small asteroids is very large. If the combined mass were that of the moon, this would require 1,000 asteroids of the seventh magnitude or 1,000,000 of the twelfth magnitude. A number of asteroids large enough to produce a measurable attraction would illuminate the sky faintly in their region. Such a band, it is claimed, has been seen at times, but its existence is uncertain. Some claim that the gegenschein is caused by the asteroids.

The question naturally arises, shall we continue indefinitely to try to discover new asteroids and to observe those known. The disturbances in the orbits caused by Jupiter make necessary a great amount of computation in order to predict the positions of the asteriods at future times. Moreover, the methods of treating the problem are different for different classes of asteriods. For this reason a great amount of labor is required by these bodies and it had been questioned whether all of it is worth while. The discovery of Eros in 1898 gave new inspiration to the work and this has been added to by the discovery of the Trojan group since that time. There is absolutely no question that these asteroids are very valuable

and that they will be followed. There are many, however, which seem to be of little use, and the work done upon them seems to be more or less wasted. It is difficult to predict, however, just what uses may be made of them. Mathematical theory can be tested by the asteroids and sometimes unusual ones may be required for this purpose. Certain ones to be mentioned later fall into this class. We may ask if we have not already discovered all the bright ones and all which are worth while. The fact that the most important discoveries have been recent is a sufficient answer. In particular we may say that our discoveries are prejudiced by the fact that most of the work has been done by northern observatories and by the fact that naturally most of the searching has been done near the ecliptic. If a near asteroid had a considerable inclination it might appear in the sky far from the ecliptic when nearest to us. Eros, for instance, when it was nearest in 1900 was nearly 55 degrees north of the equator, even though its inclination is but 11 degrees. If a fainter asteroid were thrown 55 degrees south of the equator it would very likely, almost surely, be missed under present conditions. The chances that it would be discovered when that far north even are small. Now, since just such a thing is likely to occur with a near asteroid, there are no reasons for thinking that there may not be an asteroid nearer than Eros. 1911 MT was at first thought to be such an one. This remarkable asteroid, which we have already referred to as (719) Albert, was found on October 3, 1911. A nearly full moon, bad weather and failure to telegraph the discovery nearly caused its loss. Observations were finally found covering two weeks time and a fair orbit computed. Its very rapid motion at first indicated that it was probably nearer than Eros, but its orbit shows that it does not come quite as close. Its orbit is very eccentric, so that it can be seen only on rare occasions. It was in good position in 1915, but I think that it was not seen. It has probably been lost. This at least affords hope of finding other such bodies. Perhaps the orbit of this one may be in error by such an amount that Albert may really be nearer than Eros. The

faintness and eccentricity make accurate determination of its orbit difficult and also will make micrometer measures impossible in much of the orbit, so that it seems unlikely that it will supplant Eros for parallax work. When each asteroid is found it is necessary to distinguish the new from the old. This is not always an easy matter. It seems desirable to find all new asteroids possible in order to get those which are valuable. This can only be known after their orbits have been computed. No asteroids have been abandoned yet, but some have been lost through insufficient observation. Greater economy in labor is being practiced. Watson, who discovered twenty-two asteroids, left a sum in his will to provide for the computations required for these bodies.

What is the significance of this zone of asteroids in the solar system? This we cannot answer. We can only speculate upon what we find. We can scarcely doubt that the asteroids are in some way equivalent to a single planet. We shall consider some of these speculations. We have already mentioned the earliest, Olber's hypothesis of an explosion. This hypothesis seemed both plausible and fascinating. Lagrange studied the problem and found that the motions of the first asteroids indicated a velocity of explosion less than twenty times that of a cannon ball, a velocity not improbable. Olbers reasoned that the products of an explosion would return to the point of explosion. His own discovery, Vesta, failed to confirm it. His reasoning is correct except that it omits from consideration the great influence of Jupiter. The effect of this planet is to twist and turn the orbits of the asteroids so that even if the explosion hypothesis were true, the orbits would be so transformed after a few thousand years that it would be impossible to find the point of the original explosion as Olbers tried to do. Encke tried to include Jupiter's influence by computing the secular perturbations to see if there was a time in the past when the orbits did all have a common point of intersection. He could find no such time. The orbits were farther from intersecting in the past than at that time. His results are not conclusive, however, for great periods of time.

The full computation has been made for a few asteroids, with negative results, but it is admitted that the effect of the mutual attraction of the asteriods may vitiate the result. This effect cannot be included until we know the masses of the asteroids, and the large number would make the computation prohibitive. We can say, however, that the orbits have not had a common point of intersection for millions of years. In fact, the enormous difference between the distances of the inner and outer asteroids makes it almost self-evident that these orbits have never intersected. For these reasons Olbers hypothesis is given little consideration now in its original form. A modification of it has been proposed, namely, that there have been several explosions at different times. If one body exploded there is no reason why the fragments should not in turn explode. This has not been shown to be impossible.

The nebular hypothesis asserts that the contracting sun left behind it rings of vapor. The denser parts of the ring would condense upon cooling, but if the ring were uniform, the condensation would take place uniformly and the ring would become changed to a zone of little planets like the asteroids. If the ring were not uniform a single planet would be formed. The influence of Jupiter may account for the behavior of this ring. The great variety of orbits seems to be somewhat against this hypothesis. The asteroids form a ring about the sun somewhat as the rings surround Saturn.

The planetesimal hypothesis starts with a spiral nebula containing points of condensation or nuclei. A large nucleus passing through a region rich in finer material would collect it to itself to form a large planet. The asteroids would be formed from a mass of material with no large dominating nucleus.

The capture theory says that they have been captured by the planet Jupiter much after the manner of Jupiter's family of comets. It asserts that once the whole system has been filled with such bodies and that they have had their motions altered by attraction and a resisting medium until they have been lost to become parts of the planets Jupiter or Saturn or to become their satellites or remained as asteroids. That

some of the asteroids have become the satellites of Mars, Jupiter, Saturn, Uranus and Neptune in part or all, is an idea which has much to support it. The zodiacal light is probably caused by asteroidal bodies mostly within the earth's orbit. The further study of the asteroids may give clearer ideas as to the method of formation of our system.

It is impossible to go into much detail here as to the relations between Jupiter and the asteroid orbits, because such treatment must necessarily be of a mathematical character. The most pronounced effect of Jupiter is shown at those places where the mean daily motions of the asteroids are commensurable with that of Jupiter. It is found that at these places there are no asteroids. The mean motion of Jupiter is 299″.1. If we multiply this by 2, 2½ and 3 we get 598″, 748″ and 898″. Corresponding to these values we find no asteroids with mean motions between 584″ and 607″, 744″ and 751″ and 887″ and 904″. It is known that when the mean motions are nearly commensurable the perturbations may become large, the long period inequality of Jupiter and Saturn being such a case. The motions of the asteroid Hecuba, which lies near the place where the mean motion is twice Jupiter's, have been given a large amount of consideration by theoretical astronomers. There can scarcely be any doubt that Jupiter in some way is the cause of these gaps. It was supposed that the motion of an asteroid in these critical places would be unstable and that it would be thrown out of the place by Jupiter. Prof. Newcomb in the Encyclopedia Britannica writes: "It is now known that such is not the case, and that the only effect of even an exact commensurability would be a libration of long period in the mean motion of the planetoid. The gaps cannot therefore be accounted for on what seemed to be the plausible supposition that the bodies required to fill these gaps originally existed but were thrown out of their orbits by the action of Jupiter. The fact can now be more precisely stated by saying that we have not so much a broken series as a tendency to an accumulation of orbits between the points of commensurability." Brown, writing at nearly the same time in *Science*, does not agree with

this. He points out that the asteroids found near the critical points do not as a matter of fact show libration, and that if this were the case we should expect accumulations at these points rather than gaps. He admits librations at the critical points, but assigns very small limits within which the motion would be stable, limits so small, in fact, that there is but small chance that an asteroid would be found within them. This view seems to fit the facts better. At these points the inclinations and eccentricities are also such that they show the effect of Jupiter's action. Asteroids which lie near these critical points are of particular importance because they test the theories proposed to explain the gaps.

SOME PROBLEMS IN PSYCHOPHYSICS

By Francis N. Maxfield

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The development of modern psychology has been characterized by a breaking away from the psychology of the past, which was based deductively upon a speculative philosophy, and by the foundation of a new empirical science, bringing to its service many of the tools and methods of the older sciences, and inventing tools and methods of its own. This modern movement is usually dated from the year 1878, when Wundt, then holding the chair of philosophy at Leipzig, founded at that university the first laboratory of experimental psychology. Wundt had begun his career as a professor of physiology at Heidelberg and brought to the new science of psychology the data and experimental procedure of this older science. In the forty years since that time, psychology has been developed as an empirical science which can no more stand by itself without dependence upon physiology than modern physiology can exist without chemistry. Though the object of psychology continued to be defined as the study of the processes of consciousness, the principle came to be universally admitted that nothing happens in consciousness which does not have its conditions determined by certain physiological processes. If one accepts the definition of psychology given by the modern behavioristic school that "psychology is the science of the reaction of the individual to the stimuli to which his environment subjects him," this principle is still further emphasized.

Accepting this principle, we find that we are interested in an individual human being, not as a mind or soul made up of or possessing certain faculties such as perception, will, and reason, but as an organism that reacts in a certain manner in a certain situation. We find that this reaction is determined by the arousal of certain physiological processes involving particularly

the nervous system of the organism, and we have consequently seen the development of a psychology of the lower animals and of the human infant as well as an objective study of the human adult.

That branch of the science of psychology which seeks to determine the functional relation between the physical processes which we call stimuli and the reactions and mental processes of the organism is called *psychophysics*. For example, I ask one of you to tell me which of these two weights is the heavier. If one of them weighs 100 grams and the other 120 grams you will very readily select the heavier, whereas, if one of them weighs 100 grams and the other 101 grams, you are very likely to tell me that the two are equal. Now the first weights act as stimuli giving rise to certain sensations or perceptions of weight due to strain upon the muscles of your arm which are richly supplied with sensory nerve endings. Certain neural and brain processes are involved. The second case is similar, but in the first case the weights are perceived as different and the judgment "heavier" is given, and in the other "equal," by which you imply that your perception of weight is not different from that aroused by the standard weight with which it is compared. The psychophysicist is interested in determining under what conditions your perceptions of weight are the same and under what conditions they are different. He seeks further to formulate some mathematical statement which will generalize his findings just as the astronomer or physicist derives his mathematical formulæ.

For this purpose various experimental methods have been devised and intricate mathematical processes for treatment of experimental data. I do not intend to weary you with any detailed mention of these, but I feel that it may not be uninteresting to discuss briefly some of the every-day bearings of this new scheme and some of its simpler concepts.

One of these concepts is that of the *threshold*, a term introduced into psychology by Herbart in 1811. It is perfectly obvious that, in order to be perceived at all, a stimulus must have a certain intensity. Suppose you are looking at the stars

on a clear moonless night. You can see stars up to the first, second, and third magnitude, and if your eyesight is keen, up to the sixth magnitude. But you know from using a telescope that there are thousands of stars too faint to be seen by the unaided eye. The intensity of light from one of these is not great enough to arouse a sensation. In other words, its intensity is below the threshold of consciousness. The threshold of consciousness may be defined therefore as that value of the stimulus which is just sufficient to produce a sensation, less values being imperceptible.

It is clear that the value of this threshold for any given kind of stimulus may vary for different individuals and in the case of vision, for example, for the two eyes and for different parts of the retina of the same eye in the same individual. Its value will also vary with varying conditions of attention, expectation, practice, and fatigue. You will see at once that the value of this absolute threshold of intensity is an index of the sensitivity of the observer. The lower the threshold, the greater his sensitivity; and the higher this threshold, the less his sensitivity.

To take another illustration from astronomy. Two observers, A and B, are gazing at a small constellation. A is a trained astronomer, while B is an amateur. A sees nine stars in the constellation, while B sees only seven. A makes a drawing of the stars in this constellation and shows B where the two stars which the latter does not see should appear, or he allows him to observe them through a good field glass. He further shows B how to focus his eyes on a point a little to one side of the position where the stars are to be seen, as for dim light the center of vision is not the most sensitive portion of the retina. These changes in the method of observation, this practice, and attentive expectation act to lower B's threshold and he finds that he can now see nine stars in the constellation just as A does. His absolute threshold has been lowered and his sensibility increased.

We sometimes speak of an upper threshold or limit of sensibility in contrast with that just described which is designated as the lower threshold. The upper threshold is that stimulus value beyond which there is no sensation. Both are well illus-

trated in the case of tones produced by vibrating bodies or air columns. Some observers have claimed to hear as a tone the vibrations of a tuning fork vibrating sixteen times per second, but for most of us this lower limit is about thirty-two vibrations per second. On the other hand, as will be observed if you listen to this Galton whistle, we may shorten a vibrating air column, making the pitch higher and higher, until we pass the upper limit of sensibility and no tone is perceived. This upper threshold for pitch is about 36,000 vibrations per second.

In light waves we find a similar phenomenon. If a beam of white light is diffracted by a prism or grating and thrown on a screen, we get a spectrum, but only a part of this will be visible to the human eye. We see violet, blue, green, yellow, orange, red; but it can be easily demonstrated in the physics laboratory that beyond the violet are the ultra-violet rays and beyond the red are the infra-red rays. The former are beyond the upper and the latter below the lower limit of sensibility or threshold for the human retina.

The lower threshold values in animals are often quite different from those observed in the human species. Dogs have a remarkable sensitivity to olfactory stimuli. Romanes tells the story of a dog whose olfactory sensitivity was tested in the following manner. The dog's master walked nearly across a large field and turned abruptly to the right. He was closely followed by twenty-four men, each of whom tried to step exactly in the footsteps of the man in front of him. At the place where the owner of the dog turned to the right the first man following turned to the left, the second to the right and so alternately until twelve had followed to the right and the other twelve had gone to the left, each stepping in the other's tracks as before. A short time afterward, the dog was set on his master's trail, which he followed rapidly to the turning point. Here he ran past, but returned to "pick up the scent." This he did readily, following his master's trail without hesitation.

The problems of the psychophysicist are not limited to the determination of these limits of sensitivity—these upper and lower thresholds. Lying between these limits are series of stim-

uli all of which may give rise to parallel series of sensations varying in quality, intensity, and duration. The stimuli consist of some form of energy—kinetic energy, light, heat, etc.—which may be measured in terms of physical units. This light is 32 candle power, that is 16; this is a weight of 100 grams, that of 120, etc. It does not take a psychophysicist to see that, roughly speaking, the stimulus intensity series and the sensation intensity series are parallel. Two weights are heavier than one. A 32-candle-power light is brighter than a 16. So true is this parallelism that our language is often confusing. We can not be certain which series is meant when some one says that "one sound is louder than another." The statement may refer to sensation intensity or to the intensity of the sound waves of the stimulus, or to both.

In spite of this rough parallelism, it can easily be shown that the sensation intensities may be indistinguishable, whereas the stimuli are clearly different, or that stimuli or equal intensities may be perceived as different. It is therefore the problem of psychophysics to study the relation which does exist between these two series.

This brings us to the concept of the so-called *difference threshold*. As I said before, we may not be able to distinguish between weights of 100 and 101 grams—that is, the sensations of weight aroused by lifting them cannot be discriminated. It is obvious that if we gradually add to the 101 gram weight we shall finally get a weight which will be judged heavier than our 100 gram weight. If such a weight is 103 grams, our difference threshold in the direction of increase is 3 grams. That is, a difference of 3 grams in stimulus intensity is just sufficient to produce distinguishable sensations. In a similar way by comparing weights of 99, 98, 97 grams, etc., with our original standard weight of 100 we come to a weight which is just perceptibly lighter than our standard. If this is 98 grams, our difference threshold in the direction of decrease is 2 grams. A more sensitive subject might distinguish 102 and 99 grams from 100. His difference thresholds in this case would be therefore 2 grams in the direction of increase and 1 gram in the direction of decrease. The

interval between these two difference thresholds is known as the *interval of uncertainty*, since the person lifting the weights included in this interval cannot judge certainly as to whether the comparison weight is heavier or lighter than the standard.

These measures of difference have often been called "just perceptible differences." By taking account of these just perceptible differences in any given stimulus scale, either of quality, intensity, duration, or extent, we may arrange stimulus series which are paralleled by series of just distinguishable sensations or perceptions.

The series of just distinguishable sensations are often very extensive. For example, in the octave between A^1 with 435 vibrations per second and A^2 with 870 there are over 1200 tones which can be discriminated or are "just noticeably different" to the practiced ear of a musician.

It will make the concept of the lower threshold, or stimulus *limen*, and that of the difference threshold, or difference *limen*, clearer to mention a few analogies. The first is that of the tangent galvanometer first suggested by Delboeuf (1831–1896).

The tangent galvanometer is an instrument for measuring an electric current by means of a magnetic needle suspended at the center of a coil of wire through which the current to be measured is passed. The angular deflection of the magnetic needle is observed and read from a graduated scale. It is found that the greater the current passed through the coil, the greater the total deflection of the needle from its original position. It is further observed that the amount of angular deflection due to a given increase in current is not, however, directly proportional to the increase in current, these increases producing less and less additional deflection the farther the needle swings from the original position. Moreover, no current can be made strong enough to cause a deflection of 90°. It has been found that the current intensity is directly proportional to the tangent of the angle of deflection. The instrument is therefore called a *tangent* galvanometer.

If we observe the action of this instrument as our electric current is gradually increased we find an interesting phenomenon

which is analogous to that observed in our stimulus-sensation series. First we note that the current has to be of a certain strength before the inertia of the needle and the torsive resistance of the suspension fiber are overcome and any deflection at all is noted. This corresponds to our lower limit of sensibility, our lower stimulus threshold. If a finer needle with a gossamer suspension fiber is used, this resistance may be reduced and our instrument rendered more sensitive, *i. e.* its stimulus threshold has been lowered.

The analogy can be carried still further, in that, when the needle is held at any given angle by a current of a certain strength, a further deflection will not take place, for the reasons mentioned before, until a certain amount of increase of current has been made which can overcome these resistances. This necessary increase is analogous to the difference threshold and may be greater or less according to the sensitivity of the instrument and to the position of the needle.

Another convenient analogy may be found in the platform balance such as may be seen in any drug store. Here scale pans are mounted at the two ends of a horizontal beam swinging freely in the vertical plane on an axis perpendicular to this plane of rotation. If these pans are in equilibrium a tiny bit of dust falling on one of them will not cause a tilting of the beam. But if dust should be allowed to accumulate on one of the pans the resistance due to inertia and friction would finally be overcome and this scale pan would drop and the apparent equilibrium would be destroyed. The mass of the dust necessary to effect this disturbance of equilibrium may be compared to the lower threshold of sensibility, the just perceptible stimulus already mentioned. If the balance were made more sensitive by reducing the friction, or the mass of the pans, or by increasing the length of the beam, this equilibrium would be disturbed by a smaller amount of dust, *i. e.* its stimulus threshold would be lowered.

If two equal masses are placed on these scale pans in their previous condition of equilibrium they will balance one another and we have again a condition of equilibrium. To disturb this

again it is necessary to add an appreciable amount to one of the pans. This is comparable to the difference threshold or just perceptible difference.

A third illustration may be found in observing the elasticity of a rubber band. It is necessary to exert a certain amount of force upon it before it will stretch at all. Again we have our lower threshold or limit of sensibility. After it has begun to stretch, relative changes in length will be proportional to the force exerted upon it. If held in a stretched position, however, an appreciable increase in the force exerted must be made before it will stretch further. Again we have our difference threshold. If force enough is applied, the limit of elasticity will be reached, the rubber band will break, and we have an anlaogy to our upper threshold or upper limit of sensitivity.

The human subject may be compared to such an instrument as the platform scales. A weight must be of a certain intensity before it is perceived at all. A weight held in the hand must have a "just noticeable difference" added to it before it is perceived as heavier. Here we have the stimulus threshold or limit of sensitivity and the threshold of difference.

Psychophysicists may define these thresholds in specific units such as grams, candle-power, ampères, etc., or they may all be reduced to the absolute unit of energy, the erg. Thus Langley determined that the just perceptible light sensation under favorable conditions was stimulated by .0000003 erg. The just perceptible sound sensation is represented by a figure considerably smaller.

Interest in these quantitative aspects of psychology, or in the science of psychophysics as it has come to be called, dates from the researches of a German physiologist, Ernest Heinrich Weber (1795–1878), at the University of Leipzig, who in 1849 published his celebrated work "On the Sense of Touch and Organic Feelings." He experimented with lifted weights and found that he could just distinguish weights of 32 and 35 drachms. He found further that in order to make a weight just noticeably different from one of 32 ounces it was necessary to make a certain proportional rather than an absolute difference between the

weights compared, *i. e.* 3 ounces instead of 3 drachms. Weber stated his conclusions as follows: "In the discrimination of objects that are compared the one with another, we do not perceive the difference between the objects but the ratio of this difference to the magnitude of the compared objects."

His work was followed by that of Gustav Theodor Fechner (1801–1887), who had at one time held the chair of physics and later that of philosophy at Leipzig. Fechner gave the name *psychophysics* to the new field of investigation, carried on many experiments in practically all the different sense fields, and wrote extensively on the mathematical and philosophical aspects of the subject. He gave the name of *Weber's law* to the psychophysical principle as stated by his predecessor.

Fechner sought to give a mathematical statement to the psychophysical law. The functional relationship between the sensation series and the accompanying stimulus series he expressed by grading the former in an arithmetical progression and the latter in a geometrical progression. The successive terms of an arithmetical progression are formed by adding a certain difference to each preceding term, while those of a geometrical progression are formed by multiplying each preceding term by a given ratio. The mathematical relation between two such progressions or series may be expressed by saying that successive terms of one are directly proportional to the logarithms of the successive terms of the other. Fechner's mathematical statement of the psychophysical law then becomes

$$E \propto \log R$$

where E is the sensation and R the stimulus. Here we have a formula analogous to that for the magnetic deflection of the tangent galvanometer where

$$A \propto \tan \theta$$

when A equals the number of ampères and θ equals the total angle of deflection.

Fechner's law, as the logarithmic statement of the psycho-

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physical principle has been called, may there be stated in one of two ways:

(1) *If stimuli are arranged in a geometrical series the sensations accompanying them will form an arithmetical series;* or

(2) *The sensation is directly proportional to the logarithm of the stimulus.*

For Fechner the sensation aroused by a just noticeable stimulus was a sensation unit, in terms of which other supraliminal sensations and sensation differences could be measured.

An approximately exact illustration of this law is found in the magnitude of the visible stars. The classification of stars according to their brightness goes back to Hipparchus (125 B.C.) and Ptolemy, who divided the naked-eye stars arbitrarily into six "magnitudes," the first magnitude stars being some twenty of the very brightest and the sixth magnitude stars those just visible to the unaided eye. Now a first magnitude star is about one hundred times as bright as a sixth magnitude star. Stars may therefore be divided arbitrarily on the basis of photometric findings by the use of a light ratio of 2.51 ($\sqrt[5]{100}=2.51$). That is, a star of the second magnitude is 2.51 times as bright as one of the third, one of the third 2.51 times as bright as one of the fourth, and so on. This method, first proposed by Pogson in 1850, has been generally adopted and most of the naked-eye stars have been measured photometrically and placed on this "absolute scale."

It would be gratifying if all stimulus series and sensation series parallel to them were found to conform to this simple functional relationship. When we test these series in different sensation fields for varying intensities, qualities, durations, etc., we find only a rough approximation of Fechner's law and that is usually limited to rather narrow ranges of these series. Weber's statement of the psychophysical principle is more accurate because more general and because it stresses perception rather than sensation alone. *We do not perceive the difference between compared stimuli or objects, but the ratio of their difference to their magnitudes.* Thus formulated we have a law which is substantiated by the results of experimentation.

I may be allowed to speak briefly of some of the methods of laboratory procedure which this new science has developed. One of the best known is called the "method of just perceptible differences." Suppose it is required to test the just perceptible difference in the case of the perception of line lengths. I start with a standard line of say 150 mm. in length and a comparison line of the same length. I then proceed to lengthen the comparison line until it appears to the observer to be longer than the standard. The difference in length will be the just perceptible difference in the direction of increase. Then I start with a line longer than my standard and shorten it until it is first judged equal to the standard. The difference in length will be the just imperceptible difference in the direction of decrease. The mean between these two differences will be the difference threshold in the direction of increase. By a similar procedure I may determine the difference threshold in the direction of decrease. Between these two limits we have the interval of uncertainty within which no difference is observed. Similar experimental procedure may be used in the case of other forms of perception and for the determination of the absolute threshold, the just perceptible stimulus, in any of them.

Another procedure is known as the method of mean error. In this method the observer takes an active part and is required to adjust a variable stimulus so that it reproduces the standard. His error of reproduction is determined in the manner which I shall explain later.

In the method of mean gradations the observer adjusts a variable stimulus so that it may lie half way between two fixed stimuli.

In the method of constant stimuli the observer is required to judge the relative intensities or other attributes of two stimuli presented to him by the experimenter. He judges a line to be longer, shorter, or equal, or a weight to be heavier, lighter, or equal, in comparison with a standard line or weight. This is sometimes called the method of right and wrong cases. In general we may say that we have *gradation methods* and *error methods*.

In actual laboratory procedure the methods of securing experimental data consist essentially of requiring a subject under standardized conditions to give a large number of judgments upon a standard stimulus paired in turn with a series of comparison stimuli. The data derived are then treated from the point of view of the method of just perceptible differences or that of the method of constant stimuli.

To give a concrete example. You will recall the experimental procedure by the method of just perceptible differences referred to above. If this sensitivity to linear differences had been tested by the method of constant stimuli we should have required the subject to give judgments on our standard line of 150 mm. compared in turn but in mixed order with each of seven lines of 144, 146, 148, 150, 152, 154 and 156 mm. respectively. The judgments given in this procedure may be treated, however, by the method of just perceptible differences as well as by the method of constant stimuli. Suppose that a series of our comparison stimuli were judged as follows:

156 "longer"
148 "equal"
146 "shorter"
152 "equal"
144 "shorter"
154 "longer"
150 "longer."

We may then proceed to make an empirical determination of the values of the thresholds in the following manner. We find 150 the shortest comparison stimulus, which is judged longer. This is the just perceptible positive difference. We find 152 the longest comparison on which the judgment "longer" is not given. This is the just imperceptible positive difference. The difference threshold in the direction of increase is therefore the mean of these two values, or 151. We find further that 146 is the longest comparsion stimulus which is judged shorter (the just perceptible negative difference). The difference threshold in the direction of decrease is therefore 147. Subtracting 147

from 151, we have the interval of uncertainty equal to 4 mm. This empirical determination of the interval of uncertainty becomes more trustworthy if we average the results of a large number of series of judgments upon our different comparison pairs.

Those of you who have been accustomed to make accurate measurements in a physical laboratory are familiar with the idea of "probable error." If I make successive measurements of the length of the edge of a cubical block of iron I get a series of results which, though approximately the same, are not identical. I average these results and consider myself justified in assuming that this average is more trustworthy as representing the true length of the block than any individual measurement. By the methods of the mathematics of probability I calculate the "probable error" of this mean result. Suppose my average or mean measurement is 250 mm. and the probable error of this result is 1 mm. This signifies, in the language of probability, that there is a probability greater than one-half that the true value lies between the limits 251 mm. and 249 mm. The amount of this probable error will obviously depend upon the refinement of the instruments and methods of measurement. Where a scale of great precision is used by a trained observer this probable error will be less than if the measurements were made with a less accurate scale in the hands of a careless or untrained observer. To take an example from Merriman's "Method of Least Squares," a certain angle was measured by the same observer with three different instruments, a theodolite, a transit, and a sextant. Four observations with the theodolite gave a result of 6° 17′ 5″, with a probable error of 1.4″. Five observations with a sextant gave 6° 17′ 12″, with a probable error of 5.8″. Six observations with the transit gave 6° 17′ 0″, with a probable error of 23.3″. The true value of the angle is certainly in the neighborhood of 6° 17′, since the results of all three instruments agree in this. But the limits between which the true result may be expected to lie vary with the three instruments. The true value as determined by the theodolite, the most accurate of the three, may, with a probability greater than

one-half, be considered to lie between the values of 6° 17′ 5″ −1.4″ and 6° 17′ 5″ +1.4″, that is, between 6° 17′ 3.6″ and 6° 17′ 6.4″. The less accurate sextant gives limiting values of 6° 17′ 6.2″ and 6° 17′ 17.8″; and the transit, the least accurate of all, gives limiting values of 6° 16′ 36.7″ and 6° 17′ 23.3″. The range of uncertainty of each, taken in order, is twice that of the probable error, viz., 2.8″, 11.6″ and 46.6″ respectively.

It will be evident to you that the results of observations by the so-called "error" methods yield to mathematical treatment of this kind. The probabilities that certain judgments "heavier," "lighter," or "equal" will be given by the observer are determined for each comparsion weight. This gives a *psychometric function* for each category. Within the limits of the interval of uncertainty, corresponding to the limits of the probable error, no one of these psychometric functions will be greater than one-half. That is, there is a probability greater than one-half that between these limits the weights will not be judged heavier or lighter.

The elaboration of these methods of experimentation and the mathematical methods of treatment for the data derived from them have developed rapidly in the last twenty years. Professor Urban of this university has been active in this field, and I hope that you may have an opportunity to hear him tell you about it after the war is over and he is free to return to this country. But I promised not to lead you into the intricacies of the mathematics of psychophysics, important as this aspect of the problems involved may be. I shall leave them aside to consider some of the more general aspects of this problem.

The statement of the principle of relativity as found in Weber's psychophysical law has not been confined to psychology. We find it in the principle of marginal utility in economics. As pointed out by Bernoulli (Daniel Bernoulli, 1700–1782), "we may regard the satisfaction which a person derives from his income as commencing when he has enough to support life, and afterwards as increasing by equal amounts with every equal percentage that is added to his income; and *vice versa* for loss of income." (A. Marshall, "Principles of Economics," 6th ed.,

p. 135.) Of course the term "satisfaction" is a psychological concept and the principle of Bernoulli and that of Weber are probably fundamentally the same.

Just as we notice the increase in light when a second electric light is turned on in a room but do not notice an additional light in the room already illuminated by a thousand lights, so ten dollars makes an appreciable increase in the monthly wages of a chauffeur but would not be noticed if added to the income of the millionaire whose car he drives. It is a "drop in the bucket" to use a folk-phrase expressing this principle, while "an inch on the end of a man's nose" is another folk-phrase to express a difference which is readily appreciable.

Conversely a man with a dozen chickens in his back yard will feel the loss of one chicken more than the poultry raiser who loses one from his flock of three thousand. In other words, the "*marginal utility*" of any commodity to its possessor diminishes with every increase in the amount of this commodity which he already has.

Another example of the principle of relativity is seen in the law of diminishing returns. A man may use improved methods of agriculture and "make two blades of wheat grow where one grew before," but the same amount of additional improvement will not make three blades grow where two grew before. An athlete after three weeks' training reduces his time for the hundred yards dash from $10\frac{2}{5}$ to $10\frac{1}{5}$ seconds. It will require greater effort or more than three weeks' time to reduce his time from $10\frac{1}{5}$ to 10 seconds flat.

An example of this principle comparable to the psychophysical law is seen in the relation of rainfall to agricultural production. Before wheat can be grown at all a minimum amount of annual rainfall is necessary. This is the rainfall threshold, and we have a "just possible" wheat production. Even small increases in this rainfall yield rapid increases in the amount of wheat per acre which can be grown. But this rate of increase in production will fall off rapidly, and whereas an increase from 12 to 20 inches may double the crop, the increase from 40 to 48 will not do so. Finally a point is reached where further increase in

rainfall will not increase the crop but may even be harmful and lessen production.

Even our use of units of measurement is according to this principle of relativity. Certain natural units, the foot, the pace, the day, become standardized and we compare observed magnitudes with these units.

In practical life as well as in making scientific observations we are constantly making use of instruments of precision. I look at my watch which I set a week ago as I went by a shop window on Chestnut street. Compared with a dollar watch which I carried in camp this summer my watch is an instrument of precision. Compared with my watch the chronometer in the Chestnut street shop is an instrument of precision, and yet this chronometer is corrected from time to time on the basis of reports received from the U. S. Naval Observatory at Washington, where other instruments of precision, transits, micrometers, verniers and so forth, are used to determine the correct time. Thus we see that precision is a relative matter. When I look at my dollar watch I feel fairly certain of the time within say, six or seven minutes. That is, if the watch shows half-past four I may be reasonably certain that the true time lies somewhere between 4:24 and 4:36. Now if my own watch shows 4:30 I feel fairly certain that the true time lies somewhere between 4:29 and 4:31. If the chronometer of Chestnut street shows 4:30 I may be reasonably certain that the true time lies somewhere between 4:29.5 and 4:30.5, or perhaps between even narrower limits.

I therefore speak of the chronometer as being more accurate than my watch and of my watch as being more accurate than its dollar substitute. Now scientists who make constant use of instruments of precision not only use them for making measurements, but from time to time make tests of the accuracy of the instruments themselves. In this way they can determine the degree of certainty of a given reading.

Suppose we consider for a moment such an instrument of precision as a ship's chronometer. This is an instrument, as you know, for recording time, and in principle it is not different

from a very accurate watch. It is important in determining the position of a ship at sea to be able to know the time with a good degree of certainty. The constant error of such an instrument is a certain regular rate of gain or loss per day. The instrument is set for Greenwich time and its time readings are compared from day to day with the true time as determined by some observatory. Its regular gain may be three seconds per day. This is a constant error. But continued observations show that it is not exactly three seconds: it is sometimes slightly more or slightly less than this. This difference is the variable error and may be due to one or many unavoidable causes. The navigator makes allowance for the constant error, but the variable error remains and must be taken into account as affecting the certainty of a given time observation. The limits of this variable error may be calculated in the same way as the probable error of the measurement of the side of the iron cube or the angle already mentioned.

Now in a psychophysical sense the observer himself may be considered as one of the instruments of precision involved in any measurement such as that of the angle just mentioned. If instead of the same observer using three different instruments, a single instrument, say the theodolite, had been used by three different observers, A, B, C, each making the same number of observations of the angle, we should find analogous results; A's result might give a probable error of 0.8″, B's 1.8″ and C's 2.0″. We could then rate the accuracy of these observers. A is the most accurate, B less accurate than A, and C least accurate of all. We may carry the analogy further and say that considered as an instrument of precision the human being acting as an observer may show both constant and variable errors. This constant error when present in observers is known as the "personal equation." The history of its discovery is interesting.

In the records of the Astronomical Observatory at Greenwich we find the following entry made by the British Astronomer Royal, Nevil Maskelyne, (1732–1811), who writes after holding that position for thirty years:

"I think it necessary to mention that my assistant, Mr.

David Kinnebrook, who had observed the transits of stars and planets very well in agreement with me all the year 1794, and for the greater part of the present year, began from the beginning of August last to set them down half a second of time later than he should do according to my observations; and, in January of the succeeding year he increased his error to eight-tenths of a second. As he had unfortunately continued a considerable time in this error before I noticed it, and did not seem likely to get over it and return to a right method of observing, therefore, though with reluctance as he was a diligent and useful assistant to me in other respects, I parted with him.

"The error was discovered from the daily rate of the clock deduced from a star observed on one of two days by him and on the other by myself, coming out different to what it did from another star observed both days by the same person, either him or myself. . . .

"I cannot persuade myself," he continues, "that my late assistant continued in the use of this excellent method (*i. e.* Bradley's eye and ear method) of observing, but rather suppose he fell into some irregular and confused method of his own, as I do not see how he could have otherwise committed such gross errors."

This record made by Maskelyne is the first account we have of any observation of a personal equation. Maskelyne considered that the discrepancies between his and his assistant's observations were due to some faulty method on his assistant's part and did not concern himself with investigating the matter further. The incident of Mr. Kinnebrook's dismissal was, however, mentioned in a history of the Greenwich observatory published twenty years later (1816) and here it attracted the attention of Bessel (Friedrich Wilhelm Bessel, 1784–1846), the Königsberg astronomer.

It was hard for Bessel to see how an assistant, who would have every reason for bringing his observations into agreement with those of his superior, should have so persistently shown this constant error. To test the matter for himself he compared his own results with those of other astronomers. In December,

1820, he observed ten stars on alternate nights with Dr. Walbeck, determining the rate of the clock as Maskelyne and his assistant had done. When they first compared their results they found a difference not of 0.8 seconds, but of 1.1 seconds. Being trained astronomers, they took particular precautions on the following two days, but with very little difference in the result, for the discrepancy was nearly one second (average for eight days 1.041 seconds). So careful were they that Bessel wrote, "We ended the observations with the conviction that it would be impossible for either to observe differently, even by only a single tenth of a second." Still Bessel was not satisfied. Walbeck was less experienced in transit observations than he, and so similar comparisons were made either directly or indirectly with many of the best astronomers of Europe.

It became recognized therefore that there is in each observer a tendency to observe star transits in a characteristic way which may differ in time results from other observers equally well trained (the relative personal equation), and that these time results differ by a more or less constant amount from the true time measured (the absolute personal equation). What applies in observing star transits by the eye and ear method applies more or less generally in all cases where a person reacts in any way to a certain stimulus. This "constant error" is analogous to the constant error of the chronometer and in a similar way it may be determined within certain limits of variation and allowed for.

In the present day the royal astronomer would determine experimentally the personal equation of any second Mr. Kinnebrook and instead of dismissing him would make corrections accordingly.

You will see, therefore, that in some senses the human being is an instrument of precision, having, as do scientific instruments of precision, a certain degree of sensitivity, a certain interval of uncertainty and certain constant and variable errors. You see, too, that the analogy of the galvanometer, the scale-pans, etc., is not merely an analogy.

The psychophysicist can study the reactions (judgments,

choices, discriminations, etc.) of this human instrument and determine the limits of its sensitivity and the probable error of its results.

Nor is the scientist working in his laboratory the only one interested in these problems. They are fundamental in many of the important problems of human society and yet also appear in many of the insignificant happenings of the day. Thousands of dollars are spent annually in giving musical instruction to persons utterly incapable of acquiring a musical education. Psychophysical methods like those developed by Professor Seashore in the laboratory of psychology at the University of Iowa can determine whether an individual is capable of acquiring a musical education. We have a problem in psychophysics when a man buys a spool of silk to match a sample his wife has given him. He does not wish to take home a shade just noticeably different. But whether it is a matter of thousands of dollars as in one case or of ten cents in the other, these problems are interwoven with all the activities of our every-day life.

A MILLION DOLLARS A DAY FOR LIGHT

By C. E. Clewell
Assistant Professor of Electrical Engineering

Consider, if you will, what it is which largely distinguishes the present age from past ages, or even the present century from past centuries. What is it which limited for centuries the highly developed civilization, for example in Greece, to a small group here and there, whereas today, civilization in a highly developed state is world wide and not limited by space conditions to any particular or localized world group or small number of world groups? What has caused the ocean liners to replace the simpler craft in use prior to the time of Robert Fulton, and why has the loom been taken from the home and put into the factory? Or again, why has transportation been so transformed that the stage coach has been replaced by the railway express almost, if not entirely within the memory of many still living?

Professor Charles F. Scott of Yale University, in a recent address, has aptly answered some of these questions when he states that "Many factors have contributed to the broadening in the world's civilization, among which have been modes of travel, modern industry, the invention of the steam engine, electricity and so on." He goes on to point out, however, that the steam engine is the underlying basis of it all, for it is representative of manufactured power, and it has largely done away with the limitations which were imposed in past ages by the sole use of animal power.

The results, which are so familiar to all, have revolutionized the mode of civilized life. Manufactured power has reduced the distance from Philadelphia to New York from several days to several hours; our navigation has encircled the world by means of the fast liners of gigantic proportions compared with the older sailing craft; we have elevators in our office build-

ings and stores; moving stairways; trolleys; automobiles; and our foodstuff and other supplies often come from points of remote location. Imagine, if you can, a snow storm or a flood of such severity as to cut off temporarily all the channels of manufactured power; bringing transportation to a standstill, cutting off the food supply and telephone service, and you have, in thus severing the normal channels of manufactured power, a paralysis of the community.

However, with all these transforming influences, brought about fundamentally by the coming of the steam engine, there have been limitations to the use of power from such a source. For example, while it has been possible to develop power economically in large quantities by the steam engine, it has been difficult to transmit this power with any degree of flexibility. Thus we find through New England and elsewhere, even today, factories and mills whose very architectural lines have been dictated by this difficulty of transmitting power readily in mechanical form over any considerable distance. Reference is here made to those cases where a tower occupies the center of the structure, the mill taking the form of two wings extending to each side away from the central tower. Here the base of the tower contained the engine room, and from the engine, located at this point, the leather belts extended upwards through the tower and transmitted the mechanical power of the engine to the shafting on the various floors. Here, then, we see a typical case of the engine and the work it was to do standing as a unit in their space relation to each other.

Who would have dared in these earlier days, that is, say sixty or seventy-five years ago, to have suggested the wisdom of locating the engine in a separate building, possibly a mile or more distant from the mill, so as to be nearer a railroad and thus better situated with respect to a coal supply. No, the engine room and the mill were a unit and it was necessary that they remain a unit for the time.

Again, the steam engine, while capable of high economy of operation, was not only rather inefficient in small sizes, but actually unsuited to many uses. For example, who would

want a vacuum cleaner run by a steam engine? And humorous as this may sound, it represents the very limitation which was probably most apparent in the development and use of mechanical power in the earlier portion of the last century.

There were also other forms of energy into which it was next to impossible to transform the mechanical power of the steam engine. Thus there was no easy and convenient way of passing from the mechanical power of the engine into chemical energy or into light, and even a transformation into heat was cumbersome.

About 1832, Faraday made his great discovery of the principle of electromagnetic induction and thus laid the foundation for the later development of the electric generator and motor, or the dynamo as it is sometimes called. The dynamo came in as a vital connecting link between the engine and the point where the power was to be used. It took the mechanical energy of the steam engine and transformed it into energy in electrical form—easily transmitted over wires for distances up to and over hundreds of miles, and flexible in that it could be used either in the form of power through the electric motor; as energy in chemical forms; as heat, in any one of the thousand and more electric heating devices such as the sad iron, the toaster stove, luminous radiator, and the like; or finally as light, in any one of the many forms of electric lamps which have been made available since the invention of the original carbon filament lamp by Edison, thirty-seven years ago.

Thus we find that electricity has been the means for the application of power in new ways, and moreover, it has given us a unit in the form of the electric motor, which is efficient in small as well as large sizes, so that the thought of the mechanical operation of the vacuum cleaner is no longer humorous, but through the electric motor it has become a practical and economical factor of daily experience in many homes.

In brief, this gives us an outline picture of probably the most powerful and dominating single influence which has given to the world modern civilization in its present form. With it has come the trained engineer. To him is assigned the task of

directing and using the world's physical resources for the benefit of mankind. Now in this world-wide transformation from the old to the modern conditions of life there is one most striking feature. In the past, the transition from one age into the next, as well as the steps in the progress of civilization, were marked by centuries, while in the present age, the steps of progress in industry, for example, are marked rather by decades. Thus manufacturing has increased in recent years so as to double in volume in fifteen years; the use of electricity has doubled in five years; and the central station in its industry of supplying these vast requirements of manufactured power in electrical form has doubled in three years.

This, then, is the setting or background for the further consideration of one of these many influences on modern life, namely, the widespread use of artificial light on a scale hitherto unknown. Light, although known and doubtless appreciated from the earliest times, presents the seeming paradox of being a thing much used and yet the principles of which are little understood by the average person. Here, again, the scientific use of light has developed the engineer, who has devoted much study in recent years to the results of light in illuminating the objects for which the light is used. The search for the control of light in such a way as to obtain the most effective result has produced the illuminating engineer, whose interest lies rather in the effectiveness with which the eye can see under a given kind of lighting than in the lamps themselves. Of cause and effect, therefore, his task consists largely of a study into effect, that is to say, the illuminating effect or illumination rather, than into the cause, that is, the lamp itself.

Dr. Charles P. Steinmetz has pointed out that the reason why, until in recent times, very little work was possible in this new field of illuminating engineering was because of the nature of the light sources in earlier days. These included such variable sources as the camp fire, the torch, the pine knot, the candle, still later the modern kerosene oil lamp, then the gas lamp and finally the production of light by the electric current through a filament of carbon or metal. In all of the earlier

cases the source of light was of such a nature that the control of the light was out of the question. Now, however, with the steady gas or electric lamps it has been found possible to use globes or reflectors in such a manner as to conserve the total light from the lamp, directing it this way or that at the pleasure of the reflector designer, and producing results which are not only more efficient than formerly, but which are actually more restful to the eye and more pleasing in their general effect on the surroundings.

Although the use of gas for light had its beginning approximately within a century, and that of electricity dates back practically to 1879, the time of Edison's first invention of an electric lamp, the growth in the use of these energy sources for lighting purposes has been one of the most phenomenal developments in the world's history. Various estimates have been made of the annual expenditure for artificial lighting in this country, one of the recent values being placed at $322,000,000 and another at $380,000,000, thus giving us the equivalent of an expenditure of roughly *one million dollars per day*. Again, beginning with Edison's first incandescent carbon filament lamp thirty-seven years ago, the use of the electric filament lamps also showed a most phenomenal growth, until today it may be stated on a basis of estimates that there are at least 100,000,000 electric filament lamps in use in this country alone.

All of this remarkable progress, however, has not been made without at least some cost. A bold-face headline in one of the local evening papers the other day contained the statement: "Lady of 78 able to see without glasses." This was heralded as a noteworthy fact, and all will doubtless agree that it is a fact of more than passing importance. The use of gas and electric lighting has resulted in the possibility of at least two evils, one of these being the fact that by mounting the lamps overhead in a fixture and consequently in a fixed position, it has become more difficult in these days for the individual using the light to adapt it to his page of reading matter, not only in the matter of direction but also in that of intensity or quantity of lighting, than was the case when the candle or the

oil lamp was formerly found on the center table and could readily be moved so as to best serve the purpose of the individual; and again, the tendency in the new lamps, which have been put on the market from year to year, has been towards more and more brilliant light sources. Thus the brightness of the wick of an oil lamp is rated by some authorities as from 4 to 6 candle-power per square inch, while that of the tungsten or Mazda lamps is rated on the order of 1,000 candle-power per square inch. This intense brightness of the tungsten filament is what does the damage to eyesight probably to a greater degree than any other single item in the category of illumination, this statement applying, of course, in a general way to all forms of lamps, whether gas or electric, where the brightness is approximately of this magnitude.

Thus it is a matter of common experience that the oil lamp when provided with a suitable shade is softer and more comfortable to eyesight than the tungsten lighting, unless the latter is toned down to a softness almost unknown to the average user of tungsten lamps. While on this topic we may consider also a common blunder which has been made during the time of this rapid growth, in the matter of lighting fixtures. Very early lighting fixtures were made for candles, or possibly to hold oil lamps; then came the gas-flame burner. One can readily see why there should be a vertical rod or pipe, with two, three or more arms, at the ends of which a gas jet finds its necessary place. Nor is it difficult to see how a fixture designer might have transferred his older designs of fixtures adapted to candles and treated each open gas flame somewhat like a candle in its setting. However, with the coming of the electric lamp, which was fundamentally different in shape and general features from the candle or even the gas flame, we have the unfortunate picture of the older designers who were called upon to adapt their wares both to gas and electric lamps and finally to electric lamps only, in many cases making a mere substitution of the new electric lamps to a fixture shape and design developed for quite another type of light source. For example, many fixtures are still in use where a socket has merely been substi-

tuted for the old gas burner, and where three or four bare lamps suspended six to seven feet above the floor, and without reflectors or globes in extreme cases, are mounted at such an angle that in all parts of the room the unpleasant and positively harmful glare from the lamp filaments strikes the eyes of those seated in the room. It so happens, therefore, that a bare lamp placed in this position in one of these fixture designs not only often looks badly, but its bright filament is likely to produce a fatigue of the eyes for those who occupy the room, with subsequent permanent injury if such abuse of the eye is continued.

Dr. G. E. de Schweinitz made a significant statement recently to the effect that the continued abuse of the human eye by subjecting it to an unduly bright lamp, in his opinion, is productive of just as permanently harmful results to vision as the injury produced by an intense momentary flash due to an electric short circuit or other similar cause. Is it not a cause for genuine surprise, therefore, after one considers the enormous extent to which the eyes are abused in this country by looking into or by working under intensely bright and unshaded lamps, to find here and there the more fortunate one who has lived to a ripe age without the customary glasses?

It has been suggested in some of the foregoing statements that the light, when properly controlled by shades, globes or reflectors, is more effective in illuminating the objects which we desire to see. Conversely, without such devices, much of the light which might be utilized from a given lamp or lamps is wasted, because it passes away in directions other than those which we may look upon as useful directions. To this there may be added, that the accumulations of dust and dirt on these same lamps and also on the globes or reflectors, when used, cause an absorption of light all out of proportion to what one would assume by judging the glass merely by appearances. Consider, therefore, that the average home presents two possible bad conditions in its lighting when looked upon from the standpoint of efficiency alone.

One of these is the loss of much of the light because the lamp

is not provided with a shade or reflector designed, as stated above, to direct the light where it is needed. Let us assume that this loss is on the order of one-fourth of the whole. Again, if the glassware auxiliaries on the average home lighting fixture be looked upon critically, it will be found usually that a film of dust has been deposited both on the inside and outside of the reflector as well as on the outside of the lamp, thus presenting three thicknesses of dust through which many of the light rays must pass. Here let us assume that another one-fourth of the light is wasted by absorption. We then come to the astonishing fact that of the total annual outlay for light in this country amounting nearly to $400,000,000, about half of this amount, or roughly $200,000,000, may fairly be set down as representative of money nominally expended for light but which is largely wasted. Here, then, an economic question of importance must be faced which is of concern to the average user of light. Of course, if the monthly light bill amounts to two, three or four dollars for the small consumer, or possibly to twenty, thirty or forty dollars for the larger consumer, and further, if roughly one-half of this is spent for power which does not furnish the useful light of which it is capable, such a consumer fundamentally is not receiving what he is entitled to in service. But who is at fault?

The fact must be faced at this point, and it is somewhat disconcerting, that the fault is largely that of the householder or, in general, that of the user of the light. The electric company furnishes service day and night whenever required, as far as its supply circuits are concerned; and in may cases, the companies maintain a department whose main work is to aid in the attainment of the most useful and desirable results. But, the customer may say, if I go to these departments of the electric companies, I am told that I must purchase this or that style of fixture or auxiliary and I cannot afford it. It should be remembered, however, that an intelligent expenditure of this kind is not made merely for sentiment, but is made for the purpose of ultimate conservation of vision through the more effective distribution of that light under which from twenty-

five to fifty per cent of one's conscious hours are spent. Present bad conditions in lighting, therefore, are due no longer so much to a lack of ways and means as to ignorance of how the best results may be obtained.

The engineer, in his study into this field, has gone a step further. Not content with generalized ideas of how much or how little light may be required for given conditions of work and of vision, devices have been made for measurements of the apparently indefinable illumination on a desk or table surface. Although by the very nature of the case, the eye is the criterion on which the success or failure of any lighting system must largely be based, and furthermore, since the human eye has such variable characteristics in different individuals, it might seem at first glance that the specification of even fairly definite intensities of illumination on the surfaces of a given kind of thing to be seen would be difficult or impracticable.

Extended experience, however, and careful observation have resulted in the gradual acceptance of certain more or less clearly defined standards. Thus, we should find one intensity value satisfactory for reading in the home, and another and higher value required in the drafting room or for certain tasks in the workshop. Not only is it possible to calculate in advance the number and arrangement of lamps necessary for producing a given intensity of illumination, but after the lamps have been installed, the intensity may be checked up by portable measuring instruments of the kind referred to above. These instruments are also useful for studying the intensity and distribution of the illumination in existing systems, where it is apparent that the quantity of light is inadequate, but where an observer cannot, on the basis of his eyes alone, tell in what particular the lighting is defective.

These studies into the effective as well as the artistic side of artificial lighting lead into many fascinating fields. For example, there was quite recently reported the case of a textile mill in the middle west, where a system of totally indirect illumination had been installed similar to the initial system placed in the building of the Curtis Publishing Company in

Philadelphia. The operatives in this textile mill, after a short time following the installation of the new lighting system, made a request that the opaque window shades be drawn during the day so that the work might be performed under the better conditions afforded by artificial light. Here there was a case where the use of small light units uniformly distributed over the ceiling area, resulted in a really better form of illumination than was possible from the sides of the building through windows remote from the machines. The term "Better than Daylight," then, which has been applied to some forms of artificial illumination, if interpreted liberally, contains at least some truth.

Another interesting point is the effect so often noted in the late afternoons of the winter. A person who is reading near a window is warned by the approaching twilight, of the need for extra light. The gas or electric lamps are turned on, and in the mixed state of part daylight and part artificial light, the printed page still seems dim, and its brightness, as far as the eye is concerned, only gradually increases as the exterior light fades away into darkness. This phenomenon, while perhaps not of much importance in many cases, becomes significant where the artificial light is, in the main, used mostly just at this fading time of the day, as in a factory, in a drafting room, or in the surgical operating room, and then proper allowance must be made for it in planning a system of illumination with such a condition imposed.

The continual question concerning the relative merits of gas and electricity is productive sometimes of misunderstandings and of incorrect conclusions. At present, from the purely cost standpoint, there is little or no difference, if we compare the actual illumination obtainable from the modern lamps in each field when equipped with well-designed auxiliaries in the form of shades or reflectors. Historically, the use of gas was quite general before the introduction of electric lamps. The use of the latter, however, increased so rapidly after their introduction that much attention was naturally centered upon developing reflectors and globes for rendering the light more

effective, and as a consequence the gas industry soon was itself in danger of being outdistanced by its competitor, electricity. As a result, more and more attention was given to similar developments in the gas field, until today we find the showrooms of the gas company as marvellous in their beauty as those of the electric company, and *vice versa*.

In general, therefore, the average home has several available ways for improving its lighting, both in efficiency or effectiveness and in a purely artistic way as well. First, perhaps, in the order of its availability is the opportunity to use the most efficient lamps on the market. These are obtainable locally; these lamps should next be shielded so that the bright filaments or mantles are absolutely not in the line of vision from any part of the room; and finally, through the choice of suitable wall papers, not solely on a basis of colors and patterns, but with due regard to the reflection coefficients from ceilings and to the softness desired by the eye from wall hangings, a cheerfulness may often be given to a room which was formerly gloomy, thus transforming it into a space of warmth and charm.

We have spoken briefly of the vast influence of the use of electrical energy on modern civilization and of the growth in some of the fields of electric power. "Do it Electrically" and "If it isn't Electric it isn't Modern" have become familiar phrases. One indication of almost universal application of electrical energy throughout the world is the existence in the United Engineering Societies Building in New York City of a Society for Electrical Development. Just now we can still see the large posters issued by this society, showing the modern Aladdin pressing the button of the switch and summoning the genie *electricity* to his side. From December 2d to 7th was designated as the time in which to celebrate this year throughout the entire country America's Electrical Week. Here we have a significant indication of physical and intellectual forces at work trying in many ways to improve the conditions of life in this generation. To each individual, however, is given the responsibility of deciding how far he will go towards an acceptance of the advantages in full and in the most effective manner.

THE SOCIAL VALUES OF HISTORY

By Albert E. McKinley
Professor of History

I wish to speak today upon the value which a knowledge of history has in our several communities. And I wish you to consider with me how a respect for the past has influenced local and national events, and how it has been and is of practical value even in the every-day life of the man of affairs.

And at the outset let me state what I mean by history. There have been about as many definitions of history as historians, and many a student of the past has felt himself called upon to give his views upon the matter. Some of these definitions have been cold and scientific; others have been warmly sympathetic; some have been logical, theological, geological, biological or anthropological; while others have been imaginative and even poetic. For our purposes this afternoon, and reserving to each of us the right to frame a more philosophical definition at our leisure, let us think of history as the record of what man as a social being has thought and said and done. This excludes the style of research and literature known as biography, except in so far as the individual man's acts have influenced in a large way the life of the society in which he dwells.

But human society is made up of men and women and children; and it is proper for us first to look at certain principles in the life and development of the individual before we note the forces at work in society as a whole. Our friends the psychologists tell us that we have very few pure sensations; that once a sensation has been experienced it leaves an impress upon mind and brain, so that the second and third time it occurs it is no longer a simple sensation, but one tinged with the memories of the past. Out of this mingled body of sensation and memory comes the ability to refer new experiences to our previous life.

And from these many and varied experiences and memories arise the intellectual powers of apperception and conception on the one hand, and of mental or muscular habits on the other.

It is unnecessary, however, to use the language of the psychologist to call attention to the large part which experience and habit hold in the life of every one of us. Poets and dramatists long before the advent of modern psychology composed their songs and plays to illustrate the good and the evil of habit, and the danger of heedlessly defying experience. The wise saws, fables and legends of every language point the same moral: "As the twig is bent, so the tree is inclined;" "Experience is a good but a stern teacher;" "A rolling stone gathers no moss;" "A burnt child dreads the fire." From Aesop and Confucius down to Benjamin Franklin, Artemus Ward and George Ade, the worldly wise have been seeking to find expression for what the psychologists would name the apperceptive basis of muscular and intellectual activities. It is patent that the ordinary man has great respect for experience, and especially that he demands from those about him a measure of expertness which is a result of long habit.

If habit and experience thus play such a large part in the life of the individual, is it thinkable that they should not equally have a place in the life of man's institutions? Is it conceivable that each man should be guided by a knowledge of his past, and that society, made up of these men, should not be influenced by a knowledge of its history? If, with Macaulay, we call history the "essence of innumerable biographies," shall we not find that the essence contains the same principle as its component parts?

A recent writer has likened history to a line drawn on paper by a moving pencil. The past is the line already drawn, the present is the moving point, and the future is the undetermined direction which the pencil will take the next instant. The analogy is an interesting one, but the author, Prof. Woodbridge, neglects an important fact when he makes the future movement undetermined. He might have carried his analogy further and have shown how a moving pencil or any other moving body has

its future course determined partly by its own past rate of speed, and partly by the new influences brought to bear upon it. Let us suppose that instead of a pencil drawing a line he had likened history to the wheel-tracks made by a rapidly moving automobile. The past is the track in the road; the present is the moving vehicle; but what is the future? We all know that, barring the unlooked-for cataclysm from outside forces, the future marks of the wheels will be determined by two factors; first by the influence of the weight and speed of the machine—what the physicists call momentum; and secondly by the will and skill of the driver. The driver cannot ignore the weight and speed of his machine nor the direction from which it came. He cannot turn it on a right angle without danger of a catastrophe. When he makes up his mind to change his course he can round a corner safely only by considering the momentum of his car.

Human society is not far different from such a vehicle. Always it brings from the past the momentum of previous life and experience. Always in the present conscious guidance is making choices of new roads and new avenues for the future. But the new change in direction is impossible without the momentum of the past. And in most cases the new direction is a compromise between the old forces and the new ideal of conscious endeavor.

This is of course simply stating in terms of twentieth century locomotion the old doctrine of the antagonism of conservative and radical. Every stable society has its respect for the past. Every permanent organization builds upon the facts and experiences already known. But every progressive society is continually making new adjustments to meet new conditions and new environments. A rational progressive society uses the product of the past to meet these new needs. The automobile driver may ignore the momentum of his machine and attempt to turn sharply from his course. If he does not fatally injure himself, he at least will wreck his car, and while he may pursue his way upon the desired road, it will be on foot, perhaps with crutches, and not in the vehicle. So it is with society.

Radicalism and originality are essential to progress; but they can function only when fitted into the historical setting of the surrounding society.

The problem of harmonizing tradition and originality has been a recurrent one as long as human society has existed. Some societies acquired so deep a regard for the past that innovation was impossible. For many centuries tradition and ancestor-worship were so strong in China that advancement and change became almost unthinkable. In the Hawaiian Islands down to the opening of the nineteenth century the rule of *tabu* governed the actions of king, chiefs and people. The shores of time are strewn with the wrecks of tribes and nations who have adhered to the letter of the past and failed to understand its dynamic spirit. They have sought a social *nirvana*, which, being found, could be enjoyed only under the sufferance of more active neighbors, or by virtue of unusual natural protective features. A Chinese wall, a mountain chain, a thousand miles of ocean might permit the continuance of such communities.

On the other hand, there have been societies which have sought the new at the expense of the old. Many of these probably disappeared when the new choices did not fit into the needs of the environment, and they have left no record of their existence. Others advanced by an alternation of periods of quiescence and of revolution. Radical and conservative were each intolerant of the other. Victory for one in the state meant death, confiscation of property or exile for the other. Thus for centuries the petty ancient states of Greece struggled with the problem, finally to succumb to the military force of the outsider. Rome solved the problem by placing the power to initiate progress in the hands of military leaders, the body of citizens remaining quiescent. The modern world has met the difficulty by the institution of representative legislative bodies. The courts are the custodians of the old, the past, the law as it is. The popular legislature makes new laws, adapting the old forms to the new social needs and ideals.

In the modern state, therefore, there exists a greater amount

of tolerance than in the earlier communities mentioned. While revolutions still occur and doubtless will occur in the future, they have become less violent and less frequent because we have found a method of using and harmonizing the old and the new, the radical and the conservative—the modern representative assembly. And let me remind you that representative assemblies are not limited to the political field; they are used for new legislation in many religious denominations, in labor unions, in commercial and professional organizations.

And now let us see how far the modern community does use the past. I have talked around my topic in generalizations. To fully appreciate the significance of the past we must treat the subject in a detailed manner. Let us look into the life of the lawyer, the merchant, the railroad man, the newspaper editor or the manufacturer, and see what social values history possesses for such workers.

A sewing machine is a familiar if homely article in the household. It is used as a matter of habit or compulsion, and rarely do we look at it as an inheritance of the ages. Yet even in its most modern and complicated forms it contains vestigia of the earliest days of civilization. The needle was known long before the days of recorded history. Needles, bodkins and skewers of bone have been found in the prehistoric remains of cave dwellers. The use of the wheel dates back not quite so far, and yet it too was known to prehistoric peoples. The treadle and pulley came in with early historic times, four or five thousand years ago. The cloth which is sewn on the machine carries us back before the days of recorded events, to the primitive loom of early woman. Without a knowledge of these five great products of primitive culture the sewing machine of today would be impossible. But you say these things do not make a sewing machine. Of course they do not. It required the inventive genius of a Howe, a Singer, a Wilcox and many others to use in a new way what the past had created. They built upon foundations laid long previously; and later mechanics have in the same way added successively to the work of Howe, Singer and Wilcox.

One of the most marvelous of modern machines is the newspaper printing press with its million or so of separate parts. A moment's thought shows us that it was not made at one time by a special inspiration or act of original creation. It contains in its wheels and pulleys fundamental principles as old as civilization. Its types carry us back over five hundred years to Gutenberg and his contemporaries. Its revolving cylinders take us only seventy years into the past to the press of the *London Times*. Its continuous roll of paper brings us to 1865 to the Philadelphian, William A. Bullock, who was shortly afterward killed by one of his own machines. The curved type plates were adopted after the cylinder, and electric motor power was not introduced until quite recently. The devices for holding, cutting and folding the paper have had a similar progressive history; each inventor using the work of predecessors to make a more nearly perfect machine.

It is scarcely necessary to generalize upon these two illustrations. When our attention is once called to the fact, we can find the products of past endeavor in almost every mechanical device of the present. A set of views of automobiles, locomotives, harvesting machines and typewriters showing early and recent forms will prove the dependence of each later variety upon the earlier experimentation. Without a memory of the past, without even access to patent office records, our greatest inventors of today would be powerless. Some one has truthfully said it is unnecessary to go to the animal world for proofs of evolution; such proofs are better seen in every modern machine.

But let us turn to another class of workers in our community. Surely history seems to give little to the merchant who is interested in the immediate bargain of the present. Yet if we note his attitude in the bargain we will see that it is centuries old. Each generation of business men is trained to buy in the cheapest market and sell in the dearest. Each dealer is taught to charge what the traffic will bear. If he is fortunate enough to create a monopoly of any article his price is determined only by the consideration that a very high price will

discourage sales and thus reduce his total of profits. So, too, the buyer is engaged in the old search for the lowest price, irrespective of what elements of labor or capital have produced that price. The habit of bargaining is one of the oldest of social processes; we see it in the story of Jacob and Esau, in the legislation of Hammurabi and of the Roman twelve tables, and in the theories of Adam Smith and John Stuart Mill. It is one of the most primitive traits and yet today it is still one of the strongest. Follow the work of consumers' leagues, trace the use of the union label, watch the attempts to improve conditions of laborers, see the efforts to establish a minimum wage—study the history of the opposition to such movements as these, and you will understand how strong is the regard for the lowest price.

History is used in another way by the business man. Unless he is a manufacturer making goods only upon the orders of his customers, the business man is interested in the future demand for his wares. Whether he puts eggs into cold storage, or broadcloth upon the shop shelves, or anthracite in his coal yard, or wheat in a grain elevator, or railroad stocks in his vault, he is gambling upon the future; he is preparing for a demand which he believes will exist in the near future, but which does not exist when he lays in the stock; and indeed may never exist. And his judgment of the future is determined by his knowledge of the past. Not only his own experience but also that of others about him guides him in the selection of the quality and quantity of his investments. The financial columns of the newspapers always compare each day's sales with previous prices. Not content with showing the contrasts from day to day, the reports occasionally give the changes from week to week, month to month or year to year. In times of exceptional crisis or exceptional prosperity elaborate comparisons are made between the existing state of affairs and similar conditions at earlier dates. The panics of 1837, 1857, 1873 and 1893 were used as a basis of judgment and action in 1907; while the prosperity of the Civil War days and of 1900 is similarly used in these modern days of war prosperity.

The financial columns of newspapers on Monday, November 6, 1916, gave lengthy accounts of what the financial markets had done in 1912, 1908, 1904 and still earlier dates on the days following presidential elections. The business man is thus continually trying to solve the riddle of the future demand for goods by bringing to bear his knowledge of the past. His individualistic attitude toward a bargain is as old as society, and his regard for experience is the basis of his conquest of the future.

In no profession does history enter into the daily work so largely as in law. If we could but follow a successful lawyer through the tasks of one day we should be tempted to call him an historian. He deals with legislation—the most formal record of society's customs and ideals. He is not always satisfied with the letter of the law, but he goes back to its spirit; he even studies the motives which have led to its enactment. In the preparation of his case he must marshal the evidence presented by competent witnesses; and he seeks for the contemporary record of facts—a habit of action which the historian always adopts. Like the historian, he is continually gathering and weighing this evidence and presenting it in a finished form to judge or jury.

The lawyer deals with a great group of historic legal fictions, some of which go back to the old Roman law, the English common law or to still earlier practices. The equality of all before the law, the absolute freedom of contract, the creation of artificial persons called corporations, the sanctity of the jury, the sacredness of personal property, the unalienable rights of man—these and many other traditions govern the presentation of cases and the decisions of courts. Such fictions are centuries old, they sometimes stand in the way of progress, but for the lawyer they are absolute and fixed until such time as they are changed by positive legislation. The lawyer, too, wins his case by appealing to history—that is, to the action of courts upon similar cases. Where would our courts and lawyers be without the idea of precedents—tradition handed down by court decisions, by Blackstone and other commentators, per-

haps even dating from the Great Charter of 1215 itself? And when, in many instances, the lawyer has a share in shaping new legislation, how he loves to adhere to the past, even to the letter and phrase of old laws, because these words have come to possess a definite historical meaning. Of all men the lawyer uses most largely the facts of the past to decide questions of the present.

You will agree with me that it would not be difficult to show how the practical railroad man uses the past; how his equipment, his roadway, his freight charges and classifications, his attitude toward governmental control, even, perhaps, his dividends are determined by facts which took place decades or generations ago. I need scarcely refer either to the place of history in religion, for it is evident that the church's doctrine, organization, ritual and ceremonies are products of the distant past.

But the newspaper man, some one will say, deals with the present. Yet is it true that he lacks the historic spirit? He records events after they have happened, he gathers the evidence of eye-witnesses, and, if he is conscientious, he takes great pains to arrive at the truth. His editorials compare the present with the past and seek from the experience of the last week or the last century to direct his readers to a new course of action. If, as unfortunately too often is the case, his paper has espoused the doctrines of a particular party, the history of his party may become the daily diet of his readers.

We have considered the value of history to a number of special classes in the community, and we have noted to what extent each makes use of the past. It would be an easy task to extend this inquiry into the life and work of other classes, but I fear I have already wearied you with details which are almost self-evident. It is to be noticed, however, that the uses of the past here mentioned have in the main been unconscious utilization of processes worked out by earlier generations, and no doubt some of you already have questioned whether the things I have been talking about are history at all. Perhaps these facts will not be found in the old-fashioned drum-

and-trumpet history, but in any true account of a people's development, these and many more details must find a place. It is just as important for us to realize our indebtedness to the past in these industrial and technical methods as it is to think of the past as a period of the rise and fall of monarchs and great states. Our debt to Greek art and architecture is far greater than it is to any individual Greek statesman or general; the influence of French art and literature upon our own is more important than the life of any French king; an appreciation of what we have gained from pre-historic man, or from the man of the Renaissance is of greater value than a study of the Old Man of Cro-Magnon or of the life of Dante. Why not then do away altogether with narrative history and simply catalogue the remains which have come down to us, as Metchnikoff has in his work on "The Nature of Man?"

There are many reasons why this should not be done. In the first place, no one ever reads a catalogue; it would be impossible without recasting it into literary form to obtain any pedagogical value from such a list. In the second place, it is impossible to understand the culture and permanent acquisitions of any period without knowing as fully as possible the complete life of the people of the times. If we wish to use Greek ornamentation it is not sufficient to study merely the details of acanthus leaf, of egg-and-dart moulding, or of metopes and triglyths. We must understand the Greek artistic spirit, which attained such exquisite results in a wonderful harmony based upon the principle "measure in all things." Only the person who has drunk deeply at the spring of Grecian thought and action can truly apply Greek art to our modern conditions.

In the third place, a mere catalogue of extant vestigia of the past leaves out of account the time sequence, the relation of cause and effect and the concept of change or progress in human history. These ideas in themselves possess high individual and social values which should be participated in by every responsible person in the community.

And this brings me to another group of values of history—those values which grow out of the relation of social institutions to the past. I refer now to such great social institutions as the family, the school, the church and the politically organized state. Each one of these four organizations performs or should perform two services for the rising generation. In the first place, they all hand down to the young the modes of thought, speech and action of the preceding generation, often coloring then with much unnecessary custom and tradition. It is through these four institutions that the new generation is brought into at least partial conformity to the thoughts and ideals of the past; it is through them that social like-mindedness is conserved; it is through them also that bigotry and partisanship are perpetrated; and that individual eccentricities are eliminated.

But there is another service which the family, the school, the church and the state should perform for the young whom they are training. The symbol of the parent should not only be the rod, the symbol of the school not only the lesson book, the symbol of the church not only the decalogue, the symbol of the state not only the policeman. Too often these institutions are thought of only as governors which keep erring ones from wandering too far from the social center. But it is also distinctly their province to prepare youth to meet new conditions and form new judgments upon them. Individuality should be permitted in the family, originality should be encouraged in the school, the church should train its members to respond to new interpretations of the golden rule, and the state should be so organized that new needs may be promptly met by enlightened citizens. And it is one of the most promising steps in the later history of all these institutions that they have in recent years looked not only toward the completed past, but also have considered the possibility of adaptation to the unknown and always changing future. But this phase of human institutions is outside our province today. Let us retrace our steps to the place of history in these institutions. Only one illustration need be presented from the many that

will occur to all—that of history in the creation of the modern national state.

Patriotism, says H. R. Mill in the last edition of the Encyclopedia Britannica, is "a product of purely geographical conditions." But "where race and soil conspire to evoke both loyalty and patriotism in a people, the moral qualities of a great and permanent nation are secured." It would be nearer to the truth if Dr. Mill had said that patriotism is a resultant of many forces, one of which must be the occupation of a definite piece of the earth's surface. The growth of national tradition always has been closely related to a vivid picturing of the nation's past. Many of the earliest as well as the most beautiful of man's literary productions have grown not from the story-telling instinct alone, but from the desire to emulate the deeds of early heroes. How inspiring was the recital of a Norwegian saga by the scald as he stood on platform or table in some dimly lighted hall and in powerful tones, above the clatter of weapons and utensils, told of the good old times in which men were as giants. How tame and pale our modern oratory and epic poetry seem contrasted with the word pictures and strong language of the Beowulf and the Niebelungen narratives. The Roman, too, preserved with care his tales of Brutus, Horatius, Cincinnatus and other exemplars of desirable national traits. Among some races this tradition took the form of carefully memorized genealogies, such as those of the Hawaiian Islanders and of the Hebrews. Among many races, like the Greeks on one hand and the Chinese on the other, this respect for the patriots of the past resulted in erecting them into deities; producing the picturesque demi-gods of the Greeks and stifling repressive ancestor-worship of the Chinese.

In the nineteenth century nationalism has been a marked feature of European development—a nationalism which has been based not simply upon economic facts, but very largely upon the historic past. Similarities of race, language, literature, custom and tradition, which have been created by respect for the history of the community, have led to the erection of numerous independent states. Lord Byron in his "Isles of

Greece" summons the past to aid the new emancipation from the Turk:

> Earth! render back from out thy breast
> A remnant of our Spartan dead!
> Of the three hundred grant but three!
> To make a new Thermopylae!

And thus each national poet with a bugle-call from the past stirs to action the present. "Die Wacht am Rhein," "Rule Britannia," "The Star-Spangled Banner," "The Recessional," "Deutschland über Alles," "America" and hundreds of other poems testify to the power of the love of the past.

Orators and statesmen as well as poets have used the past to instil a greater regard for the nation's life. Thus did Lamartine and Webster, Pitt and Bismarck, Lincoln and Kosciusko, Jefferson Davis and Garibaldi, Gambetta and Kossuth—each in his own way.

Historians themselves have not been content with a simple narrative of events, but many of them have felt constrained to laud their nation's past and thus strengthen national pride and sentiment. This is seen in our Bancroft and England's Macaulay; in Germany's Sybel; France's Thiers and Holland's Block; and in the popular historians of Italy, Hungary, Russia and Greece. It is particularly strong in the German historians and text-book makers of the last forty years. We have witnessed the same spirit in the present week in the proclamation by Germany and Austria for the restoration of the kingdom of Poland; an appeal to the idealized historic past of the Poles.

Thus throughout the great nationalistic movements of the nineteenth and twentieth centuries history and its interpreters have been responsible for much of the good and the evil which have attended the erection of new states. Blot out the historic basis of national and racial sentiment and where would be your warring Balkan states? Where your Hohenzollern dynasty? Where your Pan-Slavism, Pan-Anglism and Pan-Germanism?

After recounting at, I fear, wearisome length these social

values of history, let me say in closing that I am keenly alive to the danger of overestimating the value of a respect for the past. It might be possible to give almost an equal number of illustrations showing that history and tradition are obstacles in the way of progress. We know of course that it is the business of the reformer and the agitator to ignore the past; and we know that the reformer and agitator often succeed in getting people about them to adopt a new and a better course of action. Nietzsche has said we suffer from "historitis" and that "no artist can paint his picture, no general can win his victory, no nation can attain its freedom, without lapsing for the moment into an utterly unhistorical state of mind." And Tennyson in the "Passing of Arthur" gives a somewhat similar view. Sir Bedivere had carried the dying King Arthur to the barge, where the three Queens had carefully lain him down. Then from the shore Sir Bedivere in anguish cried aloud:

> "Ah, my Lord Arthur, whither shall I go?
> Where shall I hide my forehead and my eyes?
> For now I see the true old times are dead
> When every morning brought a noble chance
> And every chance brought out a noble Knight.
>
> * * * * * * *
>
> But now the whole Round Table is dissolved
> Which was an image of the mighty world.
> And I, the last, go forth companionless,
> And the days darken round me, and the years,
> Among new men, strange faces, other minds."
> And slowly answered Arthur from the barge:
> "The old order changeth, yielding place to new,
> And God fulfills himself in many ways,
> Lest one good custom should corrupt the world."

Thus custom and change are in eternal conflict. Society could not live long unless it possessed the inheritance of all the ages; nor can it advance unless it is willing to cast aside the old when it becomes useless. Theodore Roosevelt says at the close of his essay on "Biological Analogies in History," "Let at least the satisfaction be ours that we have carried onward the lighted torch in our own day and generation."

But it is not sufficient that we transmit unchanged the torch of civilization. It may be necessary to put aside the torch for a lamp, or a gas-flame or an electric bulb. It is our duty to use the past progressively and transmit its light, with greater and great effulgence unto the future.

Better than the Grecian symbol of the lighted torch is the truth in the parable of the talents. Shall we be like the foolish man who hid his one talent and put it to no good use; or like the ones receiving the two and the five talents who returned more than they had received? It is still true in the social world—"To every one that hath shall be given, but from him that hath not shall be taken away even that which he hath."

THE CONSERVATION OF HORSES IN WAR

By Clarence J. Marshall
Professor of Veterinary Medicine

The writer recently made a trip to the war zone of the English and French Army for the purpose of making observations on the usefulness and care of horses in war. This trip was made possible through the generosity of a friend of the University of Pennsylvania. At the same time he was appointed a delegate by the presidents of the American Veterinary Medical Association and the American Humane Society to make observations for them along the same lines. All furnished valuable assistance in arranging for the passport and letter commendatory from the Secretary of State, the Honorable Robert Lansing, and our diplomatic representatives abroad for the necessary authority to get into the lines of the two armies. Permission was promptly obtained from the War Office in England to visit their remount stations and veterinary hospitals in England and France. Similar permission was obtained from the French War Department to visit some of their remount stations, veterinary hospitals and cavalry schools. At the same time an opportunity was given for investigating the work of the Royal Society for the Prevention of Cruelty to Animals and the Blue Cross, which is a branch of the Dumb Friends League in London. Every courtesy was afforded by these armies and societies to make the trip useful and profitable. The writer feels under a great debt of gratitude to each of them for the kindness and assistance so generously and promptly given. The experience was wonderful and the surprises many. It is hoped that due allowance will be made for any extravagant opinions that may be expressed in reviewing the observations made.

In reference to the necessity for horses in war, there can be no question. It is true that much of the work formerly done by them is now handled by machine-drawn vehicles. Each

has its place. Handling the supplies for an army is an immense undertaking and without horses an army would be hopelessly handicapped. In the early part of the present year the English government had something over 400,000 horses engaged in the war, while France had about 300,000. Wayne Dinsmore, Secretary of the Percheron Society of America, collected, through the Bureau of Foreign Commerce of the United States Government, figures showing the number and value of horses, mules, harnesses, saddles, wagons and motor-drawn vehicles that had been shipped from this country to the belligerent nations from September 1, 1914, to June 1, 1916. There were shipped during the twenty-three months 611,790 horses valued at $134,943,456; 167,387 mules valued at $34,198,955; wagons valued at $2,461,611; harnesses and saddles valued at $25,739,-015; a grand total of $197,343,037. During the same time the value of motor-drawn vehicles imported amounted to $143,122,-124. There was a balance in favor of the horse to the extent of more than $50,000,000.

The kinds or classes of horses needed in war are: Riders, light and heavy draft, and pack. The riding horses are used by the light horse troops, mounted infantry, pack and cavalry. Those used by the first three average in height from 14.2 to 15.1½ hands, and the cavalry horses are 15.1½ hands and over. Light draft horses, fit for field artillery and transport wagons, are 15 hands and over. The Shires, Clydesdales, Belgians and Percherons make the ideal heavy drafters the same as in civil life. Much of the heavy hauling is done in fields, woods, mountains, etc., where it is impossible to operate machine-drawn vehicles. The American mule has proven itself most useful in the various kinds of work.

The remount service of an army looks after such duties as purchasing horses, issuing them to the various units of the army, disposing of those that are unfit for service in the army, maintenance of an equal standard in units, studies the horse supply of the world for peace and war requirements and the mobilization in horses. This service is well organized and its duties carefully outlined. In the English army, the remount service

is controlled by the quartermaster general through the remount directorate, which is a branch of his department.

The army veterinary corps is under the control of a director general at the War Office. He is a veterinarian and has the rank of major-general. The general function of the corps is to secure the efficiency of the animals of the forces in the field by preventing the introduction and spread of transmissible diseases, reducing wastage among animals by means of prompt application of first aid, relieving the field army of the care of sick and inefficient animals, the presence of which hampers mobility, treatment in hopsitals of animals removed from the field army and by replenishing veterinary equipment. The chain of organization for this purpose is as follows: Veterinary officers with field units, mobile veterinary sections, veterinary hospitals, veterinary convalescent depots and depots of veterinary stores. The whole being controlled by the director of veterinary service, who is assisted by deputy directors, and assistant directors. Sick, wounded or otherwise unfit animals are turned over to the veterinary corps, which has entire charge of their care and treatment. When cured, they are turned over to the nearest remount section. If the case is found to be incurable, it is destroyed or sold, as considered best by the proper veterinary officer. The results from handling disabled animals in this way have been surprisingly good. Of the first 100,000 that passed through the English veterinary hospitals, seventy per cent were returned to the army cured, and in most cases better horses than when first purchased. Better results are now possible, for the reason that the hospitals are established, better equipped and the men are better trained to carry out instructions.

By a corps is meant a department of an army having its own organization and head. This is true of the army veterinary corps. Men enlist for the veterinary corps the same as in other branches of the army. There are something over 18,000 men serving in the English army veterinary corps. They are under military discipline, wear an army uniform and conduct themselves as good soldiers should. An effort is made to get men

ment of all sick, and attend the veterinary officer on his round. Sick and injured animals are reported to the sergeant as soon as possible and he in turn reports to the veterinary officer any serious or urgent case of sickness or injury and all cases of transmissible disease. It is not so much the duty of the veterinary officer to treat sick and injured horses as to retain the animals of his unit in an efficient and serviceable state. In order to do this he must give it his constant personal supervision. He is at all times on the lookout for the first symptoms of a transmissible disease, the loss of condition, faults in stable management that may cause preventable injuries, faulty shoeing, etc. His time is so much occupied with work of this kind that there is little time left to do operations, dress wounds or give very much attention to individual cases. He therefore sends, as soon as possible, all animals except minor cases to his divisional mobile section. Animals that are seriously injured or considered incurable are destroyed at once.

Aside from the veterinary officers assigned to field hospitals, mobile sections and field units, two are allowed for each remount section, a certain number are on transport duty and others with remount officers assigned to purchasing animals. There are something over a thousand veterinary officers connected with the English army veterinary corps. Some of these men have spent from twenty to thirty years of their professional life with the army. Others are from the ranks of private practitioners. Many of the best English-speaking veterinarians in the world are with this service. All are satisfied with the organization of the corps and the manner in which the work is conducted. All are thoroughly educated and trained.

The organization of their magnificent service has required years of hard work, study and experience. It had its beginning in the South African War. With constant hard work the plan of organization was completed and put into operation just in time for the present conflict. No country has done more than Great Britain for horse breeding in general. This has been proven by the many valuable, useful breeds, families and individuals that have been produced in that coun-

try. The British are as good horsemen as the world has ever known. It is but natural that they should evolve a plan for caring for horses in war that would be effectual. War is a system of extermination, and the horse is not excepted. The conservation of the horse in war is an economic proposition. England is thoroughly organized and fully equipped to do everything to conserve the animals in war and reduce their amount of necessary suffering to the minimum.

The French army veterinary service is not so well organized. The veterinarians are equally well educated and trained in military affairs as the English veterinarians. Both are required to have a four year's preliminary or high school education at least, and four years' professional course in one of their own recognized veterinary schools before they are qualified to take the examination for admission to the army. Successful candidates are then required to serve one or two years in a military school. They are veterinarians with a cavalryman's training. Promotions are made by merit only. By the time a veterinarian has gained a position of authority in either army, he has been thoroughly trained and tried. The French veterinary service was not properly organized and outlined before hostilities began. There has been no time for deliberation on these subjects since. The French veterinarians are not complaining, but are doing their best under conditions as they exist and getting good results. After the present conflict is over, it will probably be possible to outline a plan of organization that may be even more perfect than the one in use by England at present.

The principal aim of the service in both armies is to prevent disease and injuries in every possible way. The lists of diseases and injuries are but little different than those found in civil life. Of the large number of horses seen in the various hospitals, a comparatively small percentage were afflicted with wounds. There were many cases of quittors, poll evil and fistulæ. The results obtained in treating this disagreeable class of cases were unusually good, much better than ordinarily obtained in civil life. But little medicine is used in treating either surgical or

medical cases. Much more is accomplished by cleanliness, good care and sanitation than was possible in former times where more dependence was placed upon the use of medicine.

Both armies are given especial care to the subject of controlling glanders. In previous wars, it has never been possible to do much in this line. The great improvement is due, of course, to the modern methods of diagnosis. In both armies the intrapalpebral test is most generally used. The subcutaneous test is used to a certain extent. The ocular test is in bad repute and has been used but little. The serum tests are not used for the reason that satisfactory results are obtained by the use of mallein and they are not equipped to make blood tests on a large scale. Practically all the horses in both armies have been tested for glanders. This is true of all horses from over the seas. Many have been tested several times. All clinical cases and all that react to the test are promptly destroyed. Of the horses that pass through the hospitals, all are tested once or twice and the records show less than one case of glanders to the thousand tested. War has always been a prolific means of spreading glanders and the trouble would continue for many years after peace had been declared. It is believed that the present war will be an exception in this respect. If so, it is not possible to estimate the saving to agriculture and horse husbandry in general from this dreaded disease.

Both armies are fully equipped to give the necessary care and attention to diseased and injured animals. In neither has it been necessary to call for assistance from outside sources. Considerable assistance has been accepted by each. There is always a certain amount of anxiety on the part of persons interested in humane measures less there should be unnecessary suffering. It is possible for such people to do many things that add to the comfort of animals and the pleasure of those having them in charge. Provision is made by the English army for handling this question. They have a provision which states that all voluntary offers of veterinary assistance must be approved by the army council, and if accepted, will be controlled by the director of veterinary services of the forces in

the field. This provision was adopted for the reason that the work would be properly supervised and the charity could be more profitably spent. At the beginning of hostilities the Royal Society for the Prevention of Cruelty to Animals volunteered veterinary assistance. The offer was accepted by the army council. This society is one of the oldest organizations in the world that has had to do with the prevention of animal suffering. E. C. Fairholme, of London, is the secretary. He enlisted in the veterinary corps and has been promoted to the rank of captain. He is located at Brigadier-General Moore's headquarters. Brigadier-General Moore is director of the veterinary service for the English army in France. Captain Fairholme is in a position to know how diseased and injured horses are handled and what is most needed. Through his society at home, he has been able to obtain funds that have assisted wonderfully in caring for animals. In many cases hospitals have been built and equipped for the veterinary corps. The society has provided horse ambulance, rugs, blankets, etc. The charity is all distributed under the supervision of the director of veterinary services. The Humane Society and veterinary corps are in perfect harmony. One hears nothing but the highest praises for all the efforts of the Humane Society. This is the only society which is authorized to solicit or collect money or supplies for the veterinary corps and the only one recognized by the army council or that has assisted the corps.

The French army has accepted assistance from two humane societies. One is the Blue Cross, which is a branch of the Dumb Friends League in England. The other was the Purple Cross, which was organized in France. While the French army has accepted assistance from these societies, it has recognized neither. The Purple Cross met with financial reverses and has abandoned its work.

The Blue Cross was organized at the time of the Balkan War. It has furnished considerable assistance to the French and Italian armies. Its services were most appreciated in the beginning of the war. At that time the French were badly prepared and the Blue Cross promptly established a few base

hospitals and was able to care for a good many horses before the regular army service was prepared to do so. It has continued to assist in this way up to the present time.

In most cases the warring nations have been able to conserve their own valuable breeding horses. A large percentage of those purchased by them has been mares. Careful records are kept of their services. After the war is over many of the best mares will be used for breeding purposes.

While America has exported many horses and mules, it has not parted with its best class of breeds or individuals, yet most of those exported are the kind we would need if we should become engaged in war. As a means of preparedness our Government should encourage horse breeding in every possible way.

SOME INTERESTING EVENTS IN THE HISTORY OF THE DEVELOPMENT OF THE SCIENCE OF OPHTHALMOLOGY

By George E. de Schweinitz
Professor of Ophthalmology

The topic on which I have the pleasure of addressing you this afternoon was discussed by me some time ago before the undergraduates of the School of Medicine of the University. Somewhat modified, and stripped of many of its technical details, it is now hoped that its subject matter may not be without interest to a lay audience in that it concerns itself with certain facts in the history of a department of medical science which in modern times has made notable strides, which is dedicated to the conservation of vision, to the prevention of blindness and to the restoration of banished eyesight. While it is altogether fitting and proper that we should contemplate with admiration the fine equipment of the various departments of applied science and labor with industry to improve them, it is equally fitting and proper that we should not lose sight of those who strove in early days, and striving thus, worthy and loyal road-builders as they were, made it possible for those of younger years and later periods to walk these paths helped by their pioneer wisdom and stimulated by their sterling example.

Hence it is not out of place to refer briefly to the earliest beginnings of a science that has grown great with years of accumulated experience and research, to wit, the science of ophthalmology. Of ancient lineage, its exact birthday is unknown. The oldest medical book on record, the Ebers papyrus, a document which dates from about 1500 B. C., makes mention of affections of the cornea, the conjunctiva and the lids, although detailed descriptions of the clinical aspects of

these diseases are lacking. Remedies, usually local ones, were applied often with the aid of magic formulæ, and were used at certain times of the day and at certain seasons of the year to increase their efficiency. Apparently the chief surgical operation consisted in the depilation of diseased or ill-shaped eyelashes, in short, in the extraction of "wild hairs," which even in our day is an ocular panacea in the belief of many a wiseacre of the countryside.

But the procedures of ophthalmic surgery date to a much earlier period. From the Code of Hammurabi,[1] who was the sixth king of the first dynasty of Babylon and reigned about 2250 B. C., we know that the practice of ophthalmology must have been a difficult and withal a dangerous business in his day. Thus we read that "should a physician operate on a man for a severe wound with a bronze lancet and cause the man's death; or open an abscess in the eye of a man with a bronze lancet and destroy the man's eyes, they shall cut off his fingers." The surgeon of that period must have undertaken his operative procedures after grave thought and with not unnatural hesitancy. This law is particularly interesting, in that it indicates that an eye was held by these Babylonians in the same respect and of the same value as life itself.

This, too, was the attitude of the Jews, for the importance of the organ of sight is emphasized in the Bible,[2] and therefore due care in its treatment and preservation. A blind man, or one with any defect of the eye, as Magnus records in his well-known work, could not perform the priestly function; even a blind animal could not be used in sacrifice.

In the Talmud, as we know from the same authority, the Biblical tradition is maintained. The blind man was regarded almost as one who is dead, and the law enjoined that the same benediction should be said on beholding one so afflicted as is

[1] Translated and published with an introduction by the late Professor Robert Francis Harper of the University of Chicago. See also an article on ophthalmic subjects treated in the "Code of Hammurabi" by C. A. Oliver, "Archives of Ophthalmology," Vol. XXXIV, 1905, p. 6.

[2] Consult the "Augenheilkunde der Alten," by Dr. Hugo Magnus, Breslau, 1901; this book has been frequently consulted, and is many times quoted in this article.

recited on receiving the news of the death of a near relative, while the morning prayer contained a special plea for the preservation of eyesight. Scholars have always speculated whether the Egyptians, who manufactured with great cleverness false eyes to be inserted in their mummies, ever applied this art to the living human being. Definite indications that such was the case are lacking, but at a much later period than that of which I now speak, the Talmud records the case history of a young girl for whom was manufactured a golden tooth and for whom was made a golden eyeball. The latter procedure, therefore, may be regarded as the ancestor of that operation which we practice at the present time of the introduction into the emptied Tenon's capsule of a gold sphere to make a movable stump after the enucleation of an eyeball.

While numerous eye diseases are mentioned, symptomatology bears the stamp of lay production, and such attempts at descriptions of pathological conditions are entirely innocent of scientific value. The rabbis were fond of discussing the etiology of ophthalmic affections, and they attributed them to hunger, emotional excitement, grief and to the infirmities of advancing years. They knew that certain foodstuffs had a baleful influence on the organ of sight, particularly spoiled fish and bread made of impure flour, and they also knew that fresh-brewed beer and young wine were capable of producing similar detrimental effects. Evidently, even in those days, the ocular symptoms of ptomaine poisoning were understood, and it was recognized that the blurred vision of toxic amblyopia was the punishment of him who looked too often on the wine when it was red.

What is known of Aryan ophthalmology is derived from the works of Susruta. Whether the date of the compilation of this work was prior to or after the time of Hippocrates is unknown, the indications being that it was subsequent to the Alexandrian invasion, and therefore 327 B. C. Be that as it may, Aryan ophthalmology, particularly in so far it as related to a knowledge of the anatomy of the eye, had attained a high development. Firm believers in humeral pathology, the

Aryans exploited this theory, a favorite one of Grecian and of the later medieval times. Diseases of the eye were attributed to secretions of the system — gall, phlegm, air and blood. To intestinal derangement, dust, smoke, etc., various ocular pathological conditions were also ascribed. They had a comprehensive knowledge of those disorders which afflict the eyelids, the cornea, the lens and even the choroid and the retina. With surgical procedures they attacked trachoma, operated for ectropion and entropion, and even for gray cataract. Indeed, as Hirschberg[8] points out, the Aryans probably originated the operation of discission of cataract, and without doubt are responsible for the magnet operation, as well as for the plastic operations of which the Greeks and Romans knew so little.

I shall not attempt to describe the development of Greco-Roman ophthalmology — years which systematic writers like Magnus have divided into four periods, beginning 660 B. C., and passing on to the times of Galen, about 150 A. D., and to the still later times of Paul of Ægina in the seventh century.

As Magnus puts it, among all primitive people keenness of vision was paramount in importance in the struggle for existence, and therefore it is not surprising that the science of ophthalmology should have taken high rank in the art of healing. In its first beginnings it is bound up with legends and myths, even with that of the first ophthalmologist, Apollo, who descended from his Olympian heights to relieve a suffering mortal. As medical practice and experience increased, certain prime facts in etiology were noted, and that person who combined with the faculty of observation skill in applying remedies to a diseased eye became the specialist of his day, as, indeed, he has become the specialist of our own age. (Magnus, *loc. cit.*)

As time wore on, the priests collected and recorded traditions current among the people, adding their own experiences, and from these accumulated facts arose the first books which relate

[8] "Graefe-Saemisch Handbuch der Gesamten Augenheilkunde," zweite auflage, Bd XII, Kapitel 23, p. 47, 1908. Prof. Hirschberg's "Geschichte der Augenheilkunde" has also been frequently consulted and quoted in the preparation of this section. These volumes are a monument of Prof. Hirschberg's splendid scholarship and marvelous industry.

to this subject. Time does not permit me to trace the happenings of that period from the rise of the school of natural philosophy to the beginning of the Alexandrian school, when ophthalmic anatomy and physiology were largely speculative, when the writing of Hippocrates furnished what was known of ophthalmology, which was humeral, nor does it permit me to tell in detail that although optically ground glasses were unknown to the Greeks, they had knowledge of burning-glasses, and of the magnifying power of spherical globes filled with water. The speculative character of all of this work began to decline as we approach the time of Galen, when by virtue of dissection the anatomy of the eye and the location of its diseases were better understood. As Magnus shows, anatomical studies trained the oculist to more minute and exact observation, and by the time of Celsus, that is, about the time of Christ—for Celsus, you remember, worked during the reign of Augustus—numerous eye operations had been designed, some knowledge of local anesthesia had been obtained and even mydriatics were understood.

With the advent of Galen, 150 A. D., and the anatomico-physiologic conception of normal and morbid phenomena embodied in his writings as the results of his marvelous observations, Greek medicine and surgery reached its most exalted position. As Hirschberg says, Galen is the link between the medicine of the past and the medicine of the future, and the triumph of his achievements has outlived the changes of fifteen centuries. After the death of Galen ophthalmology lost some of its aggressive character; his followers collected and commented on his works, but naturally followed the pathways which he had laid down.

Somewhat later in this period, in the catalogs of ophthalmic operations and diseases, occur instructions in regard to prophylaxis and hygiene, of which we think so much at the present time. The oculist was enjoined to attend not only to existing morbid conditions, but to busy himself with those measures which were designed to prevent the development of disease. Although, as Magnus points out, anatomy advanced and dis-

of ophthalmology. It is a far cry from the period of the height of Egyptian civilization in the eighteenth dynasty to the beginning of the twentieth century, and we may well wonder whether the farthest stretch of the vision of the imagination of the scribe who made record of the disease trachoma in the Ebers papyrus reached to that date, more than 3,000 years later, when this disease established its evil reputation. In the days of this scribe in Egyptian civilization cleanliness and hygiene held high place, and trachoma was not widespread. During the time of the reign of Theodosius the Great, when begins the decline of Egyptian civilization, which increased in ruinous fashion under the sway of the Seljukes and the Mamelukes, and especially under the misrule of the Turks, therefore since 1517 A. D., this disease gained its footing in Egypt, became endemic, and finally pandemic, and so it came about that when in July, 1798, Napoleon landed in Egypt with 32,000 men, in an incredibly short space of time fully fifty per cent of his troops was attacked by the prevalent ophthalmia, and so rapidly were they disabled, that this disease did more to defeat his army than the combined efforts of the Mamelukes and their allies. Blear-eyed and blind, these soldiers returned to Europe and brought the disease with them. Not that they introduced it, because it had existed as an endemic long before that time, but they came repeatedly in contact with the civil population and the disease was more widely disseminated than ever before, and broke out in frequent and terrible epidemics. By it armies were undone, villages were smitten, and in civil life it found a favorable soil for its dissemination in jails, asylums, and in those places where inhabitants of the poorer classes dwell together in close contact. In our day trachoma in England is an alien disease, imported by aliens, propagated amongst aliens, and handed on to the native population by aliens. So writes Mr. J. Herbert Parsons in 1904, and somewhat bitterly adds, "consistently with England's well-earned reputation for philanthropy, we are indeed acting as a trachoma filter-bed to the United States." Like some other filters, this one would appear to be somewhat leaky.

The number of aliens entering the port of New York during the fiscal year 1909 was 74,757, and among them 1,083 cases of trachoma were discovered, and during the same year among all aliens entering at the various ports of the United States, 2,084 trachoma subjects were stopped or deported, which is one-fifth of the whole number of aliens denied entrance during this period. In 1909 the New York Municipal Bureau of Health had figures representing in that city 7,090 cases of trachoma, a number which will admittedly decline under more stringent methods of diagnosis, but it is yet a frightful menace to our shores. These statements give some idea of the potency of one of the many diseases to which the eye is subject and of the enormous influence it has, not only in its power to destroy sight, but on the problems of civil and educational life.

Whether the scribe of the Ebers papyrus 3,500 years ago included in his list of ophthalmias that one which we know as ophthalmia neonatorum, colloquially termed "babies' sore eyes," I do not know, but this I do know, that fully 100,000 men, women and children in this country are, within the strict definition, blind. One-fourth of this number need not have lost their sight. The causes of their misfortune are in large measure preventable. These 25,000 persons by their blindness deprive the country yearly of about $8,000,000 worth of productive labor. Now the financial stability of our country is not disturbed by this loss of income. We can afford it, but we cannot afford the stigma which the loss entails. In this large colony of blind men, women and children, a conspicuous, if not the most conspicuous, etiological factor is the ophthalmia to which I have referred. Twenty-five per cent of the inmates of our schools and asylums for the blind have lost their sight from this ocular disease, a disease which, moreover, is a conspicuous cause of preventable blindness. About sixty-five per cent of all cases of ophthalmia neonatorum are due to a microorganism of high pathogenicity, and this virulent type of the disease it is estimated is the cause approximately of eight per cent of the blindness in most of the regions of our country.

The education and maintenance of victims of ophthalmia

neonatorum attending state schools for the blind in Massachusetts, New York, Ohio and Pennsylvania, demands an annual expenditure of public funds in excess of the cost of educating the same number of seeing children in public schools of approximately $110,000, and if all figures were available the total annual excess in these four states alone for the education and maintenance of children blind from this nearly without exception preventable cause would not fall short of $150,000.

In one state of this Union it has been computed that 100 of the young blind have lost their sight from ophthalmia neonatorum, and that these 100 young persons will eventually cost the state $300,000 for education alone, while the economic cost to the commonwealth because of their lifelong dependence will be many times that sum. Four years ago, in the State of Pennsylvania $123,000 was appropriated by the commonwealth to four institutions or organizations for the blind, and approximately $32,000 of this money was devoted to the welfare of those who are blind from ophthalmia neonatorum. It costs the State of Pennsylvania approximately ten times as much to educate one blind child as it does to educate one seeing child. Remember this disease is in large measure preventable, thanks to a discovery made by Credé more than thirty years ago, and the use of the Credé prophylactic method especially in large institutions in which trained nurses and trained service are available has been the means of saving many a new-born baby's eyesight. But not all babies exposed to this infection find their way into the world surrounded by institutional care, and therefore other measures have been devised and should be in operation for the elimination of this preventable cause of blindness, which in general terms may be classified as measures which include education, compulsory notification, the punishment by law of offenders against properly constructed regulations, and compulsory prophylaxis. It is not germane to the present address to discuss this matter more in detail, except to urge that society in the best sense of that term should lend the entire weight of its influence in efforts to compel the carrying out of the legal regulations to which I have referred, and which

exist in many states of this Union, and to compel, too, the many hospitals, in this state, for example, which receive and accept state aid to include in their equipments suitable accommodations for babies thus afflicted, and who cannot have suitable care in their own homes.

It is always interesting when one endeavors to sketch the development of any science, or branch of science, to note certain epoch-making discoveries which constitute the red-letter days in its calendar of events. Now the eye, which in its structure is not unlike an ordinary boxed camera, being therefore an optical instrument, is unfortunately, having been made of flesh and blood instead of glass and brass, not always perfectly adjusted for the reception of the rays of light which must pass into it and from it to the centers in the brain which preside over sight in order that we may have clear perception of external objects. Therefore, to alleviate the optical defects of the eye, artificial means must be found, and hence it has come about that we depend much for our happiness in life and our usefulness as working beings on spectacles.

Exactly when spectacles first came into existence, if that expression is permissible, no one knows, or, to put it in another way, the first inventor of spectacles is not known. The ancient Greeks and Romans were unacquainted with the properties of lenses of clear glass for the purpose of improving vision, either at the near or distant point. The Arabians, although learned and skilful, were denied this knowledge. While it is possible that the Saracen mathematician Alhazen, who died 1038, had some idea of lenses as aids to vision, more than this cannot be said of his relationship to this discovery. The statement so often made that the Chinese were the inventors of spectacles has in the opinion of many of the most learned scholars who have investigated this subject no foundation in fact. Legends are plentifully in existence.

Doubtless you have heard of that Chinese Emperor who is said to have observed the stars through lenses more than 2,000 years B. C., and you may have read the story of Confucius, who is said to have cured a cobbler of an eye inflammation

induced by a somewhat irate wife, in that she threw red pepper into his eyes, and who completed his treatment by presenting the cobbler with a pair of spectacles. These legends, curious and interesting as they are, do not lend much help in establishing the facts of the case. It should be said, however, that the Orientalist, Bertold Laufer, makes reference to documentary proof that the use of glasses in the Orient took place at a date slightly earlier than that at which they are first mentioned in Europe, but whether earlier than Roger Bacon's discovery, if it may be so named, is not known, and in general terms the evidence seems to favor the view that the introduction of glasses into Europe occurred independently of Chinese influence.[5]

In the *Lilium Medicinae* of Bernard de Gordon, who probably was a Scotchman, but who taught in Montpellier from 1285 to 1307, a book which Garrison[6] describes as characteristically arabist, will be found the first mention of spectacles as *oculus berillinus*—berillinus because they were originally made from a smoky stone, *berillus*, from whence is obtained the German word "brillen." It is well ascertained that from the middle of the fourteenth century glasses, as they are ordinarily called, were in general use in Europe, and their properties were understood in so far as convex glasses are concerned, and as early as 1482 opticians were at work in the city of Nuremberg. Spectacles for the relief of short-sightedness came into existence first in the middle of the sixteenth century. Doubtless all of you are familiar with the well-known picture of Pope Leo X, with his concave glasses, painted by Raphael. Cylindrical glasses, that is, those which correct astigmatism, were brought forward in the nineteenth century, but it is only since the middle of this nineteenth century that eye surgeons themselves have been concerned earnestly with the application of spectacle lenses for the relief of suffering mankind.

Naturally, research has not been lacking in an attempt to discover him to whom we owe this great boon. On the shelves

[5] Consult "History of Eyeglasses and Spectacles," by Emery Hill, M.D., Amer. Encyclopedia of Ophthalmology, Vol. VII, p. 4953.

[6] *Loc. cit.*

of the library of the Dominican Cloister of St. Catherine in Pisa rests a chronicle wherein is recorded the death in 1313 of Brother Alessandro de Spina, and wherein it is further recorded that he was an estimable and good man who could manufacture that which he saw or of which he had heard, and that eyeglasses had first been made by some one who himself was quite unwilling to share his knowledge with anybody, but that this estimable and good Brother Alessandro de Spina finished the work, and did it, as the chronicle recites, with a joyful and willing heart.

Now there was a certain Manni, who wrote an enthusiastic book on this subject, claiming that the real discoverer of glasses was Salvino Armato, and to this day there is a monument erected to him in Florence, and on its slab are these words: "Here rests Salvino Armato of the Armati from Florence, the discoverer of spectacles. God forgive him his sins. In the year of our Lord, 1317." Furthermore, Manni is quite sure that this Salvino Armato was the man who was unwilling to share his knowledge with his fellow men, but whose work Alessandro de Spina, whose death is recorded in the chronicle of the St. Dominican Cloister, completed.[7]

It is more than doubtful whether any of the statements of Manni are historically correct, but that Roger Bacon, who flourished from 1214 to 1294, was acquainted with the properties of convex lenses is well established. The following is the now famous passage from the Opus Majus, translated by Dr. Thomas Hall Shastid:

> If indeed a man observes letters and other minute objects through the medium of a crystal, either of glass or of other transparent material, set down upon the letters, and if it be the lesser portion of a sphere, whose convexity is towards the eye, and the eye be in the air, far better he sees the letters, and they appear to him larger. For, according to the truth of the fifth law of a spherical medium, whatever is below it and this side its center, and whose convexity is toward the eye, all things cooperate for size, because the angle is larger under which it is seen, and the image is larger, and the place of the image is nearer, because the object is between

[7] Consult "Geschichte der Augenheilkunde," by Hirschberg, *loc. cit.*

the eye and the center, and, therefore, this instrument is useful to the aged and to those having weak eyes. For they can see any letter, howsoever small, of a sufficient magnitude."

To summarize, therefore, it is safe to say that the first inventor of spectacles is not known, but it seems practically safe to say that the first mention in history of the employment of lenses as a means of assisting sight is that of Bacon. It is quite possible, to use Shastid's words, that the reinventor of spectacles was Alessandro de Spina, who died in 1313, and we definitely know, as I have before stated, that by the middle of the fourteenth century convex lenses and spectacles were in general use, and that concave lenses probably came in about the middle of the sixteenth century.

Now all of us know that this eye of ours rarely is so perfectly made that it conforms to a normal standard, but that either it is defective in its optical qualities because its axis is too short and we call it a farsighted eye, or its axis is too long and we call it a nearsighted eye, or there is asymmetry of the cornea, and we call it an astigmatic eye. Who first found out these optical faults?

We do not in all respects exactly know, although our knowledge in this particular is more accurate than that which pertains to the discovery of spectacle lenses. We certainly are indebted to the great astronomer, Kepler, who laid the foundation of optics in general and particularly of physiological optics, for our earliest accurate knowledge of myopia, or shortsightedness. In 1601 Kepler was asked why far-sighted people distinguished near objects more distinctly with the aid of convex glasses while near-sighted people saw better at a distance with concave glasses? He could not satisfactorily reply, but after three years of labor he solved the problem, and with its answer came the knowledge to which I have referred, that is, our first real knowledge of the nature of myopia.

In 1813, in the Philosophical Transactions of the Royal Society of London, James Ware recorded his observations relative to the near and distant sight of various persons, his paper having been written on November 19, 1812. He therefore was the first, or at least among the first, to discover the real sig-

nificance of hyperopia or long sight, that sight which exists when the axis of the eyeball is too short.[8] Writers who followed him, like Sichel and White-Cooper, while they make reference to his observations, evidently did not understand their significance, and it was not until 1853 that hyperopia was first described by Reute in a scientific manual. With the publication of Helmholtz's famous book on physiological optics, and particularly with the appearance of Donders' noted volume on the accommodation and refraction of the human eye in February, 1864, this matter was placed upon a real scientific foundation.

To that learned man, Thomas Young, "who was equally at home in the medical practice of St. George's Hospital, in the superintendence of the construction of the Nautical Almanac, in the establishment of the undulatory theory of light, in the development of the most important hypothesis relating to color perception, in the physiology of the functions of the heart and arteries, or in the decipherment of Egyptian hieroglyphic inscriptions and translation of the text of the Rosetta stone," we owe, in 1801, the discovery of the asymmetry of the dioptric system of the eye and the demonstration of normal astigmatism. But it was the Royal Astronomer Airy who recognized this defect in his own eye, corrected it and described it in the Transactions of the Cambridge Philosophical Society in 1857. In our own country, Dr. Isaac Hays of Philadelphia, in his edition of "Lawrence's Diseases of the Eye," published in 1854, records the case history of certain patients with astigmatic eyes, and his account of how he visited the optician McAllister with a young lady sixteen years old, whose education was being neglected on account of defective vision, and how with the aid of Mr. McAllister he gradually found a lens which was concave on one side and cylindrical on the other and which corrected the distortion of the images, is highly interesting reading.[9]

[8] Consult Donders on the "Anomalies of Accommodation and Refraction of the Eye," London, 1864.

[9] Consult Donders, *loc. cit.*

Now should the eye be optically defective, for example, with an axis too short, no clear image of any external object can be obtained except by the exercise of its power of accommodation, and moreover, by the continuous exercise of it in a persistent muscular effort, or, should there be asymmetry of its corneal meridians, that is, astigmatism, the eye can never receive a clear image of any external object by any exertion on its own part, no matter how much it strains to accomplish it. So, too, if the muscles which move the eye to and fro are defective in their action, insufficient, as we ordinarily say, the correlation between the focussing power of the eye and its positional adjustment is disturbed, and always a struggle goes on to reestablish it. The natural consequence of constrained and constant muscular effort is serious discomfort, and the symptoms which interpret this discomfort it is the habit in our day to describe under the term "eye-strain reflexes."

For many years the early ophthalmologists were acquainted with the difficulties of "weak sight," as they called it, but did not understand how it arose. It remained for Donders in 1859 to point out the significance of the muscular strain which was occasioned by the hyperopic eye, and to explain that to this constant muscular effort was due the pain, misery and asthenopia of its subjects. But the real knowledge of this matter is an American find which largely we owe to the genius of Weir Mitchell and to the labors of William Thomson and Ezra Dyer of Philadelphia, and constitutes a discovery which it is not too much to say, in so far as the relief of human suffering and the sum of human happiness are concerned, deserves to rank with the best scientific announcements of the nineteenth century. Listen to the proclamation of more than forty years ago:

(1) "What I desire, therefore," says Weir Mitchell in 1872, "to make clear to the profession at large is that there are many headaches which are due to the disorders of the refractive or accommodative apparatus of the eyes; (2) that in these instances the brain symptom is often a most prominent and sometimes the sole prominent symptom of the eye troubles, so

that while there may be no pain or sense of fatigue in the eye, the strain with which it is used may be interpreted solely by occipital and frontal headaches; (3) that the long continuance of eye troubles may be the unsuspected source of insomnia, vertigo, nausea and general failure of health; (4) that in many cases the eye trouble becomes suddenly mischievous owing to some failure of the general health, or to the increased sensitiveness of the brain from moral or mental cause." We have elaborated our methods, improved our instruments of precision and extended the list of interpretations of eye-strain, but otherwise we have been able to add but little to this complete and compact presentation of the facts of the case.

I cannot too strongly emphasize the importance of this discovery and the great good that it has wrought during the last forty years. It has practically revolutionized the treatment of functional nervous diseases. It has correctly established the etiological factor in seventy-five per cent of functional headaches. It has refined the diagnosis and accurately established a therapeusis in a large number of diseases which prior to this period were utterly misunderstood from both standpoints. Fancy the number of people that in olden times were trephined for a megrim, had a deep-seated seton placed in the back of the neck for the relief of the same disease, were bled to the fainting point and purged to extinction, all for the relief of recurring head pains that could have been cured had the knowledge been present by the finding of an asymmetry of the corneal meridians. I need not dwell further upon the subject. It is one of the triumphs of modern times, and I have not exaggerated when I have said that this discovery deserves to rank with the best scientific announcements of the nineteenth century.

To the keen imagination of the physicians of ancient times, although they did not have Tyndall's scientific imagination, is doubtless due their practice of ascribing to certain organs or structures of the body the seat of some attribute of the human system. Thus, the pineal gland was the residence of the soul, and in the crystalline lens the function of sight was supposed

to abide. When it was obliterated because the crystalline lens became opaque in the formation of a cataract, the situation of the lesion was not understood. Indeed, the Arabian oculists, learned as they were, believed that a cataract was a sort of a membrane in front of the crystalline lens, and sometimes it was described, for example, by the distinguished Arabian surgeon Ammar, as a body covered with a membrane like that which encloses an egg. It was not until about the middle of the seventeenth century that the seat of cataract was accurately located in the crystalline lens by a certain Werner Rolfinck, and his contention was supported by some distinguished physicians, for example, Morgagni, whose name is still preserved in connection with the pathology of cataractous lenses. Many of the medical men of the day, however, continued to hold to the old theory.

About 1700 a French surgeon named Brisseau, and the author of a well-known book of that day, a certain Antoine Maitre-Jan, accurately located the situation of cataract in the crystalline lens, and Brisseau defended his anatomical discoveries, not with very distinguished success, before the French Academy of Medicine. Some surgeons of the day, Petit in France, whose name is preserved in our books of anatomy in the canal of Petit, Boerhaave in Holland, distinguished and learned Dutchman that he was, Valsalva, he of the valves and residing in Italy, and Cheselden, the first to make an artificial pupil, satisfied themselves of the correctness of the observations of Brisseau and Antoine Maitre-Jan, although even at this time sceptics were not lacking.

For centuries the operation for the removal of cataract, misunderstood as its pathology and situation were, had been practised. I have told you that possibly it is to the Aryans we owe the origin of one of these operations, which for the most part consisted in what is known as "couching a cataract." With many modifications, it was performed by introducing a needle through the sclera behind the ciliary body, bringing its point out into the pupil space in front of the cataractous lens, which was then pressed backwards into the vitreous and the

pupil thus cleared of the obstruction. Even as late as the sixteenth century some curious rules pertained to this operation. Thus, the great Ambrose Parè directed that after the lens had been depressed into the vitreous, the needle should be held in place for so long a time as it would take to say a paternoster, which my learned friend Pergens informs us was about ten seconds.

Again, in a somewhat famous book published by Richard Banister, who flourished in London in the middle of the seventeenth century, and who was a master in surgery, an eye surgeon and a practiser of the healing art, which book, by the way, was not his own composition, but a translation of a volume written by one of Parè's students, a certain Jacques Guillemeau, occur some interesting verses on the subject of cataract. Thus, the afflicted one is comforted in this manner.[10]

Like cloudy vapours,
these the Eyes o're cast,
Yet vanished as the dew,
by sunne at last;
Long practice, carefull skill,
with observation,
Will teach the mystery
of the operation,
To end this worke
that perfect it may stand.
God guide with careful skill
our Eye, our Heart and hand.

Much store was set by the time of the day or the season of the year when cataract should be couched. Thus Banister sings:

Couch Cataracts upon
a day so faire,
That neither wind nor
clouds disturbe the Ayre,
When spring with simples
fils the Earths rich lap,

[10] Quoted from Hirschberg, "Graefe-Saemisch Handbuch der Gesamten Augenheilkunde," Bd. XIII, Kapitel 23, pp. 331, 332.

Or Autumne makes
the tree put off his cap,
The Moone ith full,
or in coniunction sly,
Or tracing Aries,
or in Gemini.

Best of all from the patient's standpoint were the directions given by that wonderful person George Bartisch, to whom I have already made reference, namely, that the cataract needle, carefully cleansed, should be laid prior to its use upon a clean towel, very much, indeed, as in this day it is placed upon a sterilized cloth after its aseptic bath.

Couching cataracts has by no means disappeared in our time, although rarely practised in modern scientific ophthalmic surgery. Just as the itinerant oculists of the middle ages went from village to village on couching cataract bent, so in India certain fakirs go from place to place, and under the shade of some spreading tree form their operating amphitheatre.

The real science of the operation for the removal of cataract begins in the middle of the eighteenth century, when Jacques Daviel introduced, first in 1748 and later more securely in 1752, the operation for the extraction of cataract. This operation with its various modifications obtains at the present time, and constitutes one of the most delicate, as well as one of the most brilliant of surgical procedures. It took a good while firmly to establish the operation which Daviel introduced, but finally, advocated by Beer and Jaeger in Vienna, Sichel and Desmarres in France, and later modified and perfected by Graefe in Germany, it has become the operation of choice, and remains so to the present time. In the days of couching cataract and in the preantiseptic periods of the extraction of cataract many eyes were lost through suppurative and infective processes, and while we cannot at the present time claim perfect success in each instance, this operation is singularly successful, and, other things being equal, yields at least ninety-seven per cent of successes. Surely great is the glory which belongs to Jacques Daviel and his successors, for by their work has been

found one means whereby a common form of blindness has been circumvented.

From ancient times a disease of the eye has been known which manifested itself in violent congestion associated with excruciating pain and followed rapidly by blindness. Because at one or other of the stages of this disease the pupil appeared to have a greenish hue, the ancient doctors gave to it the name "glaucoma," from the Greek word "glaucus," which means "sea green," a good instance of how fond these old-time medical men were of attaching to diseases and lesions names that gave no idea of their true significance, but simply described some passing but conspicuous phenomenon. To Mackenzie, the great English ophthalmologist, the credit belongs of first pointing out the most important symptom of this affection, namely, the increase in the intraocular tension. But the cure of the disease was found in the year 1856, when Albrecht von Graefe, of undying and revered memory, discovered that by removing a segment of the iris, the filtration channels of the eyeball, which had been blocked, were reopened, the tension of the eyeball, which had been raised was reduced, and the vision which had been well-nigh obliterated, was restored. This was his notable discovery, the cure of glaucoma by iridectomy, and were he not distinguished in all lines which pertain to ophthalmology, this discovery alone would have rendered him worthy of the beautiful monument which perpetuates his memory in the city of Berlin. Listen to what the greatest of living ophthalmologists says, Ernst Fuchs of Vienna: "We have only to remember that formerly every case of glaucoma inevitably led to blindness, and that now, thanks to iridectomy, the majority of glaucomatous patients can be cured. How many thousands there are who formerly would have been forced to sink year by year irretrievably into the night of blindness, but whose vision now is saved, thanks to von Graefe's immortal discovery."

Small wonder, then, is it, that when he fared forth on some well-earned holiday, from hamlet, village and countryside the people lined the road, and begged the healing of his touch, and

no man begged in vain. In features he resembled the conventional pictures of the Christ, and well he might, for Christ-like was his mission.

You may say, "you have pointed out a number of important discoveries in the domain of ophthalmology which have led to the elaboration of this science and added to the benefit of the world, but which," you ask, "is the greatest of them all, which is the one that has done most for this science in itself, and most for the other sciences which it has so long and so effectually served as handmaiden and associate?" It is not hard to tell, and the story is worth repeating. On a certain day a great physicist, sitting in his laboratory, looked across a street and into a room where some women sat sewing. In its neighborhood a roof covered with tin or similar metal reflected the rays of the sun into the room where sat the sewing women, a room which otherwise would have been obscured and its contents invisible. This seems a small matter and a trifling observation, but it led to a great discovery, and it is interesting to pause for a moment to remember how similar comparatively trifling observations, when trained minds have been at work, have led to other mighty discoveries. It needed a Newton, says Gould, to teach us the law of gravitation, although the falling of bodies to the earth had been observed since the very infancy of the human race; slings and swings were old in Galileo's time, but it was left for him to teach us the science of the pendulum. So, too, many a man has seen the sunlight reflected from a bright roof into a neighboring room where sewing women sat, but it took the genius of Von Helmholtz to ask the reason why and to answer the question with the discovery of the ophthalmoscope. He reasoned that the rays of light penetrating into the dark room were reflected back again on their pathway into his own eye and there set up the impulses which gave him the impression of these external objects. Taking a piece of silvered glass, he scratched a hole in its center, placed a lamp behind a subject's head and reflected the light into his eye. This light was the sun, the silvered mirror was the reflecting roof, the dark chamber of the eye was the room where the sewing women sat,

the patient's pupil was the open window of the room; the rays of light returned through it to the hole scratched in the silvered mirror and penetrated his own pupil and reached his retina. Then, as he modestly states, "for the first time I had the pleasure of looking into the living human eye."[11] This discovery of Von Helmholtz revolutionized ophthalmology. It enabled the observer to study not only to see what is taking place inside of an organ of the human body previously unnoted and unknown, but as time went on and experience grew richer, it enabled the observer to study not only the diseases which occurred within this living organ, but to note the changes which took place there, and which interpreted lesions in distant organs—the brain, the spinal cord, the kidneys, the cardio-vascular system, in fact, most of the systems of the human body. Therefore it is that of all the red-letter days in the calendar of ophthalmology that one which occurred sixty-three years ago is more important and more conspicuous than all the others.

With the elaboration and improvement of this instrument there was developed the great science of medical ophthalmoscopy, and now the ophthalmoscope in its relation to all other branches of medicine, in that it permits an early discovery of symptoms and phenomena which otherwise must remain hidden, and puts interpretations upon symptoms of disease which otherwise could not be explained, takes rank with the stethoscope, the laryngoscope, the sphygmomanometer, and with all other instruments of precision whereby in modern times the art of diagnosis has been refined and the field of therapeutics made more fertile. Busied as we are with the happenings of our own day, little time is found to review those of former years, and yet it is not without interest or profit to have done so.

I like to think of the surgeon-oculist in the reign of Amraphel, 4,000 years ago, holding in his trembling hand a bronze lancet,

[11] The authority for this anecdote is the late Dr. Henry C. Chapman, who related it to me. From whom he obtained his information I do not know. Von Helmoltz makes no mention of this incident in his description of his original ophthalmoscope. (Consult "Description of an Ophthalmoscope, Being an English Translation . . ." By T. H. Shastid.

wondering whether his reward was to be ten shekels of silver or a pair of amputated fingers. I like to picture the scribe of the eighteenth dynasty setting down a description of that disease which was to become a "weltkrankheit," and more than 3,000 years later was to drive from the very shores on which he wrote the legions of the great Napoleon, staggering "into the blind terror of the night." I like to watch that Aryan, who first, squatting in the shade before some blind beggar, cleared a pupil of that obstruction which centuries later the young French army surgeon proved to the unwilling, high-browed, wigged savants of the French Academy to be the opaque crystalline lens, and which still later Jacques Daviel extracted from the living human eye, and established one of the great operations of modern surgery. I like to wander into the Dominican Cloister of St. Catherine in Pisa, there to see the good Brother Alessandro de Spina polishing and moulding a piece of glass with a "joyful and willing heart," or to note how the "doctor mirabilis" makes the eyes of some colleague grown old and dim in service "see the finest letters," and relieves the distress of which six centuries before Aetius wrote but could not explain. I like to watch George Bartisch almost reverently laying the cleansed instrument upon a clean towel and carefully scrubbing his skilful fingers prior to the delicate operation he is about to perform. Almost it seems to me an earnest of that which was to happen centuries later, when by the grace of Pasteur's genius and Lester's work, the great principles of aseptic surgery were established, the promulgation and acceptance of which "have saved more lives than war has ever slain." I listen to von Dietrichstein as he questions Kepler. I note the puzzled book on the great astronomer's face. I wait three long years during which he struggles with the problem, and behold! the answer is our knowledge of myopia and of physiological optics. I stand in reverent awe as Von Graefe passes along the road and some sturdy peasant leads to him his blind and suffering mother, begging, and begging not in vain, that the great and good man shall give back to her the blessings of the sunlight. I seem to be with Von Helmholtz and to look

with him into the room where sat the sewing women. I watch him scrape the silvering from the glass; I catch the gleam of triumph on his face as it revealed to him the interior of the living human eye; I am witnessing the birth of a new science.

I listen to the vioce of Weir Mitchell proclaiming to the profession at large the list of his interpretations and the significance of his observations. I am present at the dedication of a new avenue of therapeutic advance which has brought untold thousands relief from suffering, and enabled them again to take their places in the world's insistent work.

THE DECLINE OF TRADITIONALISM AND INDIVIDUALISM[1]

By Edwin R. Keedy
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The short period of the present century has witnessed in this country many legislative and judicial changes in the law. Principles and theories long regarded as *sacro-sanct* have been repudiated or disregarded, and new ones have been adopted in their places. So pronounced are these changes that their significance and their connection with each and with other sciences become subjects of pertinent inquiry. An enumeration of some of the recent changes may perhaps furnish a basis for an answer to such an inquiry.

Court procedure is being rapidly simplified and robbed of much of its formalism both by direct legislative enactment and by delegating to courts the power to make rules of procedure. Massachusetts has a statute providing for simple forms of indictments in place of the highly technical requirements of the common law.[2] Under this statute an indictment for larceny, for instance, is sufficient which alleges that A. B. did steal the coat of C. D. of the value of five dollars. England has just passed a similar statute[3] and proposals of the same character are being urged in some of our states.[4] An example of simplified procedure is found in the act creating the new Municipal Court of Philadelphia where it is provided that "All civil actions in said municipal court shall be begun by filing a statement of the plaintiff's claim, without the issuance of any formal writ. The said statement shall consist of a

[1] This paper is an elaboration of a public lecture delivered at the University of Pennsylvania.

[2] Rev. Laws, 1902, ch. 218, sec. 15–45.

[3] 53 L. R. Stat., ch. 90.

[4] See report of special committee on criminal procedure of the American Institute of Criminal Law and Criminology, 5 Jour. of Crim. Law and Criminology, 837, March, 1915.

concise recital of the facts which the plaintiff claims give rise to his cause of action."[5] The new equity rules of the United States Supreme Court have greatly modified equity pleading, one of the rules being: "Unless otherwise prescribed by statute or these rules the technical forms of pleadings in equity are abolished."[6] It is provided in the equity rules of the Supreme Court of Pennsylvania that: "Every bill shall be expressed in as brief and succinct terms as it reasonably can be."[7] This rule is more simple than the former requirement as to the proper degree of certainty necessary for a bill in equity, the obscurity of which requirement and the respect with which it was regarded are well illustrated by the statement of a distinguished English judge: "Certainty in pleading has been stated by Lord Coke to be of three sorts, viz., certainty to a common intent, to a certain intent in general and to a certain intent in every particular. I remember to have heard Mr. Justice Aston treat these distinctions as a jargon of words, without meaning. They have however long been made, and ought not altogether to be departed from."[8]

The long recognized theory of legal liability that there shall be no responsibility without fault has been superseded by the enactment of Workmen's Compensation Laws which provide that the employer shall compensate workmen for injuries received in the course of their employment in the absence of any fault or wrongdoing on his part. The enactment of these laws indicates a recognition by society that injuries are the necessary accompaniments of industry, and that it is better for society that incapacitated workmen be provided for directly than through the indirect medium of charity.[9] In a similar

[5] Laws of Pa., 1913, No. 399, sec. 12.

[6] Rule 18.

[7] Rule 15.

[8] Buller, J., in Dovaston *vs.* Payne, 2 H. Bla., 527, 530.

[9] The arguments in favor of a compulsory workmen's compensation law were summed up as follows by Mr. Justice Pitney in New York Cent. R. Co. *vs.* White, 1917 (37 Sup. Ct. Rep. 247, 250):

"In support of the legislation, it is said that the whole common-law doctrine of employer's liability for negligence, with its defenses of contributory negligence, fellow servant's negligence, and assumption of risk, is based upon fictions, and is inapplicable to modern conditions of employment; that in the highly organized and hazardous industries of the pres-

way statutes compelling the establishment of safety and comfort devices for employees and fixing the hours of labor in certain employments indicate an effort to better the condition of society by protecting the health of a large group of its members. The statutes so far enumerated are commonly described by the general term, social legislation.

So far as laws relative to business are concerned the principle of *laisses-faire* is giving way to that of regulation. Statutes limiting business activity, and forbidding methods and means formerly perfectly lawful have been recently enacted with great frequency by the Federal Congress and the State Legislatures. The Sherman Act,[10] the Hepburn Act,[11] the Child Labor Act,[12] the Clayton Act,[13] the Pure Food Act,[14] indicate the trend of Federal Legislation, and statutes regulating insurance companies, advertisements and moving-picture theaters are examples of the type of laws which the state legislatures are now enacting. In all these instances private activity is being regulated in the public interest.

Courts have recently been as active as legislatures in changing the complexion of the law. Criminal procedure has proved a particularly fertile field, probably because it had attained the highest degree of artificiality. The principle that where an error has been committed in the trial of a case it will be presumed that the defendant was prejudiced is fast being overthrown. An error in the complaint, a failure to arraign the prisoner, the admission of improper evidence, improper remarks by judge or counsel, erroneous instructions to the

ent day the causes of accident are often so obscure and complex that in a material proportion of cases it is impossible by any method correctly to ascertain the facts necessary to form an accurate judgment, and in a still larger proportion the expense and delay required for such ascertainment amount in effect to a defeat of justice; that, under the present system, the injured workman is left to bear the greater part of industrial accident loss, which, because of his limited income, he is unable to sustain, so that he and those dependent upon him are overcome by poverty and frequently become a burden upon public or private charity; and that litigation is unduly costly and tedious, encouraging corrupt practices and arousing antagonisms between employers and employees."

[10] U. S. Comp. Stat. 1913, vol. 4, 4010.

[11] U. S. Comp. Stat. 1913, vol. 4, 3812.

[12] U. S. Stat. 1915–16, part 1, 675.

[13] U. S. Stat. at Large, 1913–15, vol. 38, 730.

[14] U. S. Comp. Stat. 1913, vol. 4, 3956.

jury, which were formerly sufficient grounds in themselves for reversing a judgment of conviction, are now frequently held to be such only when actual prejudice to the accused can be shown. The present situation in this regard is well described by a judge of the Supreme Court of Missouri in a late case.[15] He said: "The time has passed, not only in this state, but elsewhere, when pure technicalities, in the absence of evidence of well-defined injury to the accused, will be permitted to obstruct the enforcement of the criminal law." (173 S. W. 1056.) A very important case in this connection is Garland *vs.* State of Washington,[16] 1914, in which the Supreme Court of the United States held that a failure to arraign the defendant, in the absence of evidence that he was prejudiced thereby, did not amount to a violation of the "due process of law" clause of the Federal Constitution. The court directly overruled the case of Crain *vs.* U. S.[17] decided in 1896. In the Crain case the court said: "The present defendant may be guilty, and may deserve the full punishment imposed upon him by the sentence of the trial court. But it were better that he should escape altogether than that the court should sustain a judgment of conviction of an infamous crime where the record does not clearly show that there was a valid trial."[18] Referring to the Crain case the court in the Garland case said: "Technical objections of this character were undoubtedly given much more weight formerly than they are now."[19]

It is a familiar theory of the law that a corporation is a personality separate and distinct from the individuals who manage it and own the stock. As this theory has been regarded as a basic principle a large portion of our corporation law had developed from it. Lately courts have displayed a marked willingness to depart from this conception of a corporation, when in their opinion its recognition will produce injustice in the particular situation. When the fiction of a separate

[15] Walker, J., in State *vs.* Flannery, 263 Mo. 579, 588.
[16] 232 U. S. 642.
[17] 162 U. S. 625.
[18] P. 645.
[19] P. 646.

personality is employed to defeat creditors, to evade an obligation, to protect fraud, to circumvent a statute, to achieve a monopoly or defeat public convenience it will now be disregarded.[20] A recent writer makes the following pertinent observation: "There could be no better refutation of the charge so frequently made *horis novissimis* that courts are inelastic, unyielding and unwilling to respond to social and economic facts than the adjustment still in process of corporate concepts to modern business facts."[21]

In determining the value of the property of a public service company for the purpose of computing the proper rate of return, we have been accustomed to hear definite tests laid down, such as "the amount of the original investment," "the cost of reproduction," and "the cost of reproduction less depreciation." In the Minnesota Rate Cases, decided in 1912, the Supreme Court of the United States said: "The ascertainment of that value is not controlled by artificial rules. It is not a matter of formulas, but there must be a reasonable judgment having its basis in a proper consideration of all relevant facts."[22]

One of the most fundamental doctrines of the common law is that of *stare decisis*, which has been frequently applied even in cases where real injustice resulted. "Hard cases make bad law" is a familiar maxim. Lately a change in the attitude of courts toward precedents is clearly discernible. Their opinions are devoted more to a discussion of the merits of the case and less to a citation of cases. Now and then a vigorous protest against the unreasonable following of precedents is made, for instance the following picturesque utterance by the Supreme Court of Oklahoma: "We must confess to want of

[20] See U. S. *ex.* Milwaukee Refrigerator Transit Co. 142 Fed. 247 (1905). In Donnell *ex.* Herring-Hall-Marvin Safe Co. (208 U. S. 267, 273, 1908) Mr. Justice Holmes said: "Philosophy may have gained by the attempts in recent years to look through the fiction to the fact and to generalise corporations, partnerships and other groups into a single conception." In Continental Tyre Co. *ex.* Daimler Co. (1915, 1 K. B. 893, 903) Lord Chief Justice Reading said in this connection: "It is undoubedly the policy of the law as administered in our Courts of Justice to regard substance and to disregard form. Justice should not be hindered by mere technicality."

[21] I. M. Wormser, Piercing the Veil of Corporate Entity, 12 Col. L. R. 496, 518.

[22] 230 U. S. 352, 434.

respect for precedents which were found in the rubbish of Noah's Ark, and which have outlived their usefulness, if they ever had any. When the reason for a rule of law ceases, the rule should cease also. If this be revolution, then we are and will continue to be revolutionary."[23]

The attitude of courts of last resort towards regulative and social legislation has lately been undergoing a remarkable change. The emphasis formerly placed on "private property" and "freedom of contract" is now being transferred to the "public interest." Two recent cases decided by the United States Supreme Court indicate the extent to which private property may now be regulated for the public interest. In German Alliance Insurance Co. *vs.* Kansas,[24] decided in 1914, this court upheld a Kansas statute that fixed the rate of premium for fire insurance. It was strongly urged that the statute was an invasion of the rights of private property, and Mr. Justice Lamar in his dissenting opinion forcibly portrayed the effect of such legislation as follows:

"There seems no escape from the conclusion that the asserted power to fix the price to be paid by one private person to another private person or private corporation for a private contract of indemnity, or for his product or his labor, or for his private contracts of any sort, will become the center of a circle of price-making legislation that, in its application, will destroy the right of private property and break down the barriers which the Constitution has thrown around the citizen to protect him in his right of property, which includes his right of contract to make property, his right to fix the price at which his property shall be used by another."[25] The court answered the arguments against the constitutionality of the statute with the simple statement: "To the contention that the business is private we have opposed the conception of the public interest."[26]

During the same year that the Kansas insurance case was

[23] Caples *vs.* State, 3 Okl. Crim. Cas. 72, 86.
[24] 233 U. S. 389.
[25] P. 430.
[26] P. 414.

decided, the question of taking property without due process of law arose in the Pipe Line Cases.[27] The Supreme Court here upheld the provision of the Hepburn Act, making those engaged in piping oil from one state to another common carriers within the provisions of the act, although the oil so piped was owned by the pipe lines, and although no public profession had been made by them. Mr. Justice McKenna vigorously dissented, portraying as did Mr. Justice Lamar in the insurance case, the extent to which the doctrine might be logically carried, and concluded by asking despairingly: "Under it what attribute of private property is left?"[28] It may be safely answered that under the decisions of the United States Supreme Court private property is subject to legislative regulation when the public interest demands it.

The Workmen's Compensation Acts have required a consideration by the courts of the right to take private property and of freedom to contract. The conservative and radical views regarding these problems are respectively illustrated by Ives *vs.* South Buffalo Railway Company,[29] decided by the Court of Appeals of New York in 1911, and New York Central Railroad Company *vs.* White,[30] decided by the United States Supreme Court in March of the present year. In each case the question involved was the constitutionality of a compulsory Workmen's Compensation Act, and it is stated by the court in each case that such acts are radical departures from common law standards. The New York Court unanimously declared the statute in the Ives case unconstitutional, chiefly on the ground that it took private property without due process of law, the court saying: "If such economic and sociologic arguments as are here advanced in support of this statute can be allowed to subvert the fundamental idea of property, then there is no private right entirely safe."[31] In the White case the statute was held constitutional. With

[27] 234 U. S. 548.
[28] P. 572.
[29] 201 N. Y. 271.
[30] 37 Sup. Ct. Rep. 247.
[31] P. 295.

reference to the taking of private property the court said: "The close relation of the rules governing responsibility as between employer and employee to the fundamental rights of liberty and property, is of course recognized. But those rules, as guides of conduct, are not beyond alteration by legislation in the public interest." As regards the violation by the statute of freedom to contract the language of the court is equally significant: "It is said the statute strikes at the fundamentals of constitutional freedom of contract. . . . We recognize that the legislation under review does measurably limit the freedom of employer and employee to agree respecting the terms of employment, and that it cannot be supported except on the ground that it is a reasonable exercise of the police power of the state. In our opinion it is fairly supportable upon that ground. And for this reason: The subject matter in respect of which freedom of contract is restricted is the matter of compensation for human life or limb lost or disability incurred in the course of hazardous employment, and the public has a direct interest in this as affecting the common welfare."[33]

In the consideration of statutes limiting the hours of labor in specified employments the theory of freedom of contract is yielding to the demand of the public interest. The reasoning of the United States Supreme Court in Muller *vs.* Oregon,[33] 1908, as compared with that of Lochner *vs.* New York[34] in 1904, shows a decided change of attitude on the part of the court, even though the principle of the earlier case is recognized. In the Lochner case the emphasis was placed on a theoretical freedom to contract; in the Muller case the court was chiefly concerned with the question whether the statute was justified from the point of view of the practical situation which it covered. Professor Frankfurter of Harvard in an able article[35] in which he analyzes the judicial opinions relative to hours of labor statutes states that the legislation which was upheld

[33] P. 254.
[33] 208 U. S. 412.
[34] 198 U. S. 45.
[35] Hours of Labor and Realism in Constitutional Law, 29 Harv. L. Rev. 353, 363.

by the courts before 1908 "was sustained as part of the prevailing philosophy of individualism, as an exceptional protection to certain individuals as such, and not as a recognition of a general social interest." In contrast with this he says that in the decisions since 1908 "the emphasis is shifted to community interests."

Perhaps the most significant statement regarding the relation of private rights to the public interest is that of Chief Justice White in Wilson *vs.* New,[36] 1917, the case in which the Adamson Act was declared to be constitutional. After setting forth the right of Congress to regulate the carrier engaged in interstate commerce the chief justice said: "Whatever would be the right of an employee engaged in a private business to demand such wages as he desires, to leave the employment if he does not get them, and, by concert of action, to agree with others to leave upon the same condition, such rights are necessarily subject to limitation when employment is accepted in a business charged with a public interest and as to which the power to regulate commerce possessed by Congress applied."[37]

To answer the question, suggested when beginning the discussion of the present legal situation, as to the significance of the changes which are now taking place, it would seem safe to say that they strongly indicate a well-defined movement, the trend of which is away from reverence for fixed principles towards consideration of the economic, industrial and social merits of the particular controversy, away from artificiality towards simplicity, and from an individualistic towards a collectivistic attitude.

Jurisprudence is now undergoing an evolution similar to that of the law. In place of the analytical, historical and philosophical jurisprudence which had their vogue in the last century, sociological jurisprudence is now being developed, the chief exponent of which in this country is Professor Pound of Harvard. He points out that the older schools of juris-

[36] 37 Sup. Ct. Rep. 298.
[37] P. 303.

prudence are chiefly concerned with the pursuit of principles, in which pursuit he says: "There is a tendency to forget that law is a practical matter. The desire for formal perfection seizes upon jurists. Justice in concrete cases ceases to be their aim. Instead, they aim at thorough development of the logical content of established principles through rigid deduction, seeking thereby a certainty which shall permit judicial decision to be predicted in detail with absolute assurance."[88] Under this view of jurisprudence the administration of the law consists of the logical application of abstract principles of law to concrete facts. The two necessary qualities for a judge are considered to be a knowledge of rules and principles and a logical mind. The conditions underlying the facts before him are no concern of his. Our courts of last resort are constituted on this principle, the effect of which is most noticeable in those of our states which contain large cities. Although a large percentage of the cases argued before the court arise in the great cities and are the result of conditions there, it is not regarded as essential that the judges should be at all familiar with such conditions.

The same attitude is often manifested with regard to legislation. Laws are enacted, based on a theory, without regard to their fitness to meet the actual situation and even without any consideration of the question whether they can or will be enforced. Thus the statutes providing for the sterilization of imbeciles and criminals are the direct result of the theory that imbecility and criminality are inheritable. The theory, so far at least as it applies to criminality, is now discredited and the laws are not enforced. The laws against prostitution, fornication and contraception were enacted to vindicate an abstract standard of morality, the legislators failing or even refusing to determine whether or not public sentiment will permit the enforcement of such laws, and if not what will be the results of such non-enforcement?[89]

[88] Roscoe Pound, Scope and Purpose of Sociological Jurisprudence, 24 Harv. L. Rev. 591, 596.

[89] See article by Howard S. Gans, Some Consequences of Unenforceable Legislation, 1 Proceed. Acad. of Polit. Science 563.

The sociological jurists are more concerned with the purposes of law and with its results than they are with the working out or vindication of fixed principles.[40] Professor Pound thus compares the attitude of these jurists with that of jurists of the other schools: 1. "They look more to the working of the law than to its abstract content. 2. They regard law as a social institution which may be improved by intelligent human effort, and hold it their duty to discover the best means of furthering and directing such effort. 3. They lay stress upon the social purposes which law subserves rather than upon sanction. 4. They urge that legal precepts are to be regarded more as guides to results which are socially just and less as inflexible molds."[41] The method of the sociological jurists is largely pragmatic and it has been suggested that the American philosophy of law will be pragmatism.[42]

The effect of the new juristic thought is already being seen in this country. Public commissions have been appointed in some states to study and report upon conditions in advance of legislation. Courts in certain instances have decided cases on their economic merits even though an abstract legal theory was contravened. The most notable of these cases is Muller *vs.* State of Oregon,[43] in which the Supreme Court of the United States held constitutional the Oregon statute limiting the hours of labor for women. Such a statute was apparently a violation of the principle of freedom of contract as defined in former cases, but the court based its decision upon the

[40] Professor W. M. Geldart of Oxford, in his introduction to the English translation of von Ihering's "Law as a Means to An End," says of the author: "His repudiation of a 'jurisprudence of concepts' and of the 'written reason' of the Roman Law as the last word in legal and legislative theory led him to reject the individualism of the early and middle nineteenth century, and the stress which he laid on social utility gave an impulse and a justification to the 'collectivism' (to use the word in the wide sense with which Professor Dicey has used it) which has been the most characteristic tendency of our own time and the force of which is not yet spent."

[41] Roscoe Pound, Scope and Purpose of Sociological Jurisprudence, 25 Harv. L. R. 489, 516.

[42] R. L. Fowler, The New Philosophies of Law, 27 Harv. L. Rev. 718, 731; Roscoe Pound, Mechanical Jurisprudence, 8 Col. L. Rev. 605. In this connection Professor Pound said: "Law must be valued by the extent to which it meets its end, not by the beauty of its logical processes or the strictness with which its rules proceed from the dogmas it takes for its foundation." *Ibid.*, 605.

[43] 208 U. S. 412.

physical structure and social condition of women.[44] It is now impressively argued that courts of last resort should take into consideration the social and economic conditions underlying the cases that come before them and should not base their decisions entirely upon abstract rules. The new type of juristic thought may well be described as pragmatic and sociological.

After noting the innovations and tendencies which now characterize law and jurisprudence, the question naturally suggests itself: Are they isolated phenomena or do they constitute part of a general movement? In the history of former periods, notably the fourteenth and sixteenth centuries, it may be noted how closely the development of the law and of legal thought were connected with and how greatly they were affected by the changes in other fields of learning and activity. In a similar way modern legal doctrines have resulted from the pressure of economic and philosophical theories. It also has been pointed out in this paper that courts are now being influenced by conditions outside the sphere of law. These facts justify an investigation of other departments of scientific thought, for the purpose of comparing them with the present state of law and jurisprudence. This will now be attempted, beginning with philosophy.

Rationalism, with its enthronement of human reason as the final criterion and chief source of knowledge, and idealism, with its teaching that knowledge is a source of being, were the prevailing types of philosophy in the nineteenth century. Closely associated with these were metaphysics, with its search after first principles, and absolutism, the doctrine, "that some truths are indubitable, *i. e.*, capable of being established dialectically, and not subject to correction by experience."[45] All of these types of philosophic thought may be included in the one term intellectualism, with deduction as the common method of reasoning. Their chief con-

[44] See discussion of this case by Learned Hand, Due Process of Law and the Eight Hour Day, 21 Harv. L. Rev. 495.

[45] Perry, Present Philosophical Tendencies, 165.

cern is principles, not facts, and they regard theories as ends in themselves. Their by-products are formalism and dogmatism. Against this whole intellectualistic school there has been a well-marked revolt within recent years. There has been a revival of positivism, relativism and empiricism. The most significant, however, of the anti-intellectualistic groups are the pragmatists, and the Bergsonian intuitionists. These groups discredit "the human intellect as an absolute truth teller and conceive it as a fashioner of fictions, symbols or conventions or they concede to it only a limited scope as a function of knowledge."[46] Pragmatism is concerned with the workability of theories and institutions. Professor James, one of the chief exponents of pragmatism, thus described the attitude of the pragmatist: "A pragmatist turns his back resolutely and once and for all upon a lot of inveterate habits dear to professional philosophers. He turns away from abstraction and insufficiency, from verbal solutions, from bad *a priori* reasons, from fixed principles, closed systems and pretended absolutes and origins. He turns towards concreteness and adequacy, towards facts, towards action and towards power. That means the empiricist temper regnant and the rationalist temper sincerely given up. It means the open air and possibilities of nature, as against dogma, artificiality and the pretence of finality in truth."[47] Like pragmatism, the philosophy of Bergson is a method rather than a system, and like pragmatism again it refuses to recognize the intellect as the sole or last source of knowledge. The basis of Bergson's philosophy is his method of intuition. "Philosophizing," he says, "just consists in placing one's self, by an effort of intuition, in the interior of concrete reality."[48] Bergson contends that knowledge gained by sensation is profounder than intellectual knowledge,[49] and he denies the validity of logic, on which the

[46] Article on Philosophy by Professor Frank Thilly in International Year Book (1914) 553.

[47] James, Pragmatism, 5.

[48] Stewart, Critical Exposition of Bergson's Philosophy, 5.

[49] James, Pluralistic Universe, 252.

intellectualists placed so much confidence.[50] Under the new philosophic trend facts are assuming an importance greater than that occupied by theories, and the reasoning is inductive rather than deductive. A closer connection between philosophy and sociology is developing. Bergson says: "the philosophy of the future must break through the mathematical categories and take account of the sciences of biology, psychology and sociology."[51] A recent volume by the late Professor Sidgwick of Cambridge University is largely devoted to the relation of philosophy and sociology.[52] Two years' attendance at the Conference on Legal and Social Philosophy convinced the present writer that the teachers of philosophy in this country are more concerned with problems of sociology than with those of metaphysics. The very term "social philosophy" indicates a new phase of philosophic thought.

Moral philosophy, or ethics as it is now generally named, is likewise experiencing an influx of revolutionary ideas. It is now confidently asserted, contrary to the usual view, that there are no definite absolute rights, that there can be no standard rules of justice, and that no absolutely valid rules of justice can be formulated.[53] Interest is now focused on social justice, and this idea recently became politically important.

Theology is famous for its conservatism. At the present time, however, the development of new ideas and attitudes is clearly discernible. Doctrines of long standing are being

[50] *Ibid.*, 243.

[51] Stewart, Critical Exposition of Bergson's Philosophy, 4.

[52] Philosophy, Its Scope and Relations.

[53] Willoughby, Social Justice, 24–28. On page 26 Professor Willoughby says:

"In demonstrating the impossibility of framing absolute rules of justice, the necessity will be emphasized of bringing each of our acts to the bar of reason, and of determining in each case, not simply its formal accordance or non-accordance with some previously accepted rule of conduct, but whether, as a matter of fact, both the ethical motive which prompts its performance is a proper one, and its ultimate as well as proximate results will be such as will tend to advance the realization of the highest good which our reason has been able to suggest. With no thumb rules to guide us, we will be thus taught that what is right and what is wrong for us as members of a society can be determined only after we have ascertained all the circumstances which have led to a given state of affairs, as well as the conditions by which a given line of conduct is to be influenced in the future. This will mean that at least a certain amount of study of actual social conditions is imperative upon every one, and especially upon those who would seek to teach or guide others."

abrogated, and doctrines generally are receiving less attention than formerly. Sermons, like judicial opinions, now contain discussions of practical problems to the proportionate exclusion of doctrinal exposition. A professor in a Philadelphia theological seminary is said to have described the situation picturesquely as follows: "Nowadays, instead of giving a message of salvation, the minister is expected to preach on civic movements, the police force and politics."[54] Churches are now much concerned with the problem of practical achievement, and social service is really the order of the day in theological circles. There is also a movement for church consolidation, which has been consummated in several instances. Church unity has now become a familiar theme, and plans have been made for a world conference on this subject. Modern theology is becoming pragmatic and social.

The economics of the nineteenth century was more or less regarded as an exact science[55] and its methods were largely deductive. Individualism, with its accompanying corollaries of the private ownership of property, the freedom of contract and industrial competition was the basic economic doctrine, and the prevailing policy was *laissez-faire*. In the economics of today there is a great change both in attitude and method. In attitude it has become highly socialized, social economics being now an accepted phrase, and in method it has become experimental. As regards property, the idea is now gaining ground that private property is a social trust.[56] The theoretical freedom of contract is yielding to an appreciation of the actual fact that persons are frequently not free to contract as they please, because of the pressure of economic needs. In place of competition coöperation is now the keynote of industrial endeavor.[57] Consistent with these tendencies is the substitution of regulation in place of the principle of *laissez-faire*. Economists are now insisting that the use of private property be regulated for the public benefit. In the philanthropic

[54] News item.
[55] Roscoe Pound in note, 27 Harv. L. Rev. 734.
[56] Ely, Evolution of Industrial Society, 88.
[57] *Ibid.* 91.

side of economics we see the supplanting of "charity" by "social service."[58]

Mathematics and the allied sciences, physics and chemistry, are fast losing their reputations for exactitude. Apparently they are now no more exact than the law is certain. The axiom now seems to occupy about the same position with regard to self-evident truth as does Coke's famous maxim that the "known certainty of the law is the safety of all."[59] The "dogma of the indestructible and indivisible atom"[60] no longer holds sway. The atom is now regarded as having a very intricate structure, one of the widely accepted theories, the "planetary," being that the atom consists of a nucleus with several rings of moons around it. Experiments with radium have upset the belief that stability is the essential characteristic of an element.[61] An editor of the *Independent*, after the last meeting of the American Association for the Advancement of Science thus facetiously describes the position of the physicists:

"They are not only robbing the chemist of his atom, but they are upsetting the fundamental principles of their own science with reckless disregard of the consequences. They show no more reverence for Newton than they do for Dalton. Even Euclid is not safe from their iconoclastic hands. The whole is no longer equal to the sum of its parts. An atom may weigh less than its components. Mass is made dependent upon motion. Action does not always vary inversely as the square of the distance. Time is purely relative. Length depends upon velocity. The second law of thermodynamics is declared unconstitutional. Action and reaction may be neither equal nor opposite. Energy does not flow out con-

[58] See Farnam, Economic Utilisation of History, 190.

[59] "Physics has learnt to regret accepting such seemingly self-evident propositions as that a thing can not act where it is not, and modern mathematics has learned that such seemingly self-evident assertions as that the whole is greater than the part, or Euclid's parallel postulate are not necessarily true." Cohen, Place of Logic in Law, 29 Har. L. Rev. 622, 631.

[60] Millikan, Radiation and Atomic Structure, 45 Science (N. S.) 321.

[61] Ramsay, Ancient and Modern Views Regarding the Chemical Elements, Report of Smithsonian Institute, 1911, p. 183.

tinuously but is emitted in atoms. Such are some of the subversive heresies now being openly professed and preached even in orthodox circles."[62]

Medicine is also assuming a new complexion. In method it has now become avowedly experimental, and with this change have come more effective results. Further, the viewpoint of the profession has been measurably enlarged. Physicians are no longer concerned solely with the symptoms of the individual patient, but are studying the causes of disease and are taking steps to eradicate them. The extent to which this has been carried is evidenced by the establishment of chairs of preventive medicine in some of our medical schools. The necessary equipment of the medical practitioner has been greatly increased in recent years. He must now be somewhat of a psychologist and sociologist as well as a physician. In addition to this he is now coöperating, as never before, with the members of other professions. Psychological laboratories in connection with law courts afford opportunity for the physician to advise judges and prosecutors as to the proper treatment to be accorded feeble-minded and insane persons charged with crime. In connection with the whole difficult problem of dealing with mentally diseased and defective offenders members of the medical and legal professions are now working together. An interesting book[63] on the connection of medicine with education and social work appeared a few years ago. The author states the effect on medicine of such relation as follows: "No one can have followed the history of the last ten years in medicine, education, and social work and noted the increasing evidence of their interpenetration and closer coöperation without discerning:

"(*a*) The rapid growth of public medicine, whose method is educational, preventive, and sociological;

"(*b*) The consequent restriction of the sphere of the 'private doctor.'"[64]

[62] Editorial in the Independent, Jan. 29, 1917.
[63] Cabot, Social Service and the Art of Healing.
[64] Page 111.

Psychology is probably undergoing the greatest change of all the sciences. Thirty years ago a distinguished scholar defined psychology as "the science of the human soul."[65] The psychologists of that time, particularly in this country, were mostly clergymen, and their principal methods were self-observation and the derivation of psychic phenomena from metaphysical hypotheses.[66] The connection between metaphysics and psychology was for a long time very close. One of the chief concerns of the earlier psychologists was the metaphysical problem of whether or not the will is free. The older psychology was theoretical and was concerned with the mental phenomena of the individual alone.

Very little of the foregoing description applies to the advanced psychology of today. The association with theology and metaphysics has been broken, and a new one has been formed with physiology and biology. The problem of the freedom of the will is now disregarded by psychologists, and is left for the few remaining metaphysicists. A recent German writer says the "new psychology differs from the old in its spirit: it is not metaphysical; in its end: it studies only phenomena; in its procedure: it borrows as much as possible from the biological sciences."[67] The establishing of the connection between mental and nervous states has changed psychology from a speculative to an experimental science, and it is along this line that there has been a rapid development in recent years. Closely connected with this has been the change in method from self-observation to the study of the mental reactions of others, for which study many well-equipped laboratories have been established. Equally significant is the development of social psychology[68] due to a realization

[65] Porter, the Human Intellect.

[66] Hall, Founders of Modern Psychology, 319.

[67] Ribot, German Philosophy of Today, Introd. 5.

[68] "Psychology has reflected the collectivistic tendency generally noticeable in late nineteenth century thought." Baldwin, History of Psychology, vol. 2, 104. "I agree with the late Professor Croom Robertson in holding that the non-recognition of the social factor in Psychology is a grave defect in the method of the older English psychologists." Sidgwick, Philosophy—Its Scope and Relations, 158. See McDougall, Introduction to Social Psychology and Ross, Social Psychology.

of the facts that the "individual adult man, as known to us by experience, is what he is in consequence of having grown up in social relations,"[69] and that mental phenomena result from the coöperation of several individuals.[70] Attention is now given to the study of the mental phenomena of a group, mob psychology for instance, as well as to the study of the mind of the individual as influenced by his social environment. Finally there must be noted the striking utilitarian trend of psychology within the last few years. Psychological studies are now applied in many practical fields, notably in medicine, law, education, and business,[71] and experimental research in various lines of applied psychology have been started. In contrast to the older psychology which was speculative, subjective, individual and theoretical, the new psychology may accurately be described as experimental, objective, social and utilitarian.

The fine arts, as well as the sciences, are now experiencing radical innovations. Within the past few years interest has been aroused by exhibitions of painting and sculpture which represent a marked departure from traditional standards. Lack of symmetry and a suggesting rather than a depicting of the subject, combined in the case of painting with unusual color combinations, seem to characterize this new art. Its followers see in it an emancipation from the deadening restrictions of standardized rules, while its critics can see nothing but bad drawing and composition, and execrable taste in the use of colors. This new tendency in art is manifested in the work of several groups—the cubists, the post-impressionists and the futurists. They differ among themselves as to subjects and manner of treatment, but they are one in their protest against orthodox methods.

In the closely allied field of architecture there is evidence of a similar breaking away from accepted forms. Refusals to follow classical, Gothic and colonial models are now not

[69] Sidgwick, Philosophy—Its Scope and Relations, 159.

[70] Münsterberg, Psychology—General and Applied, 224.

[71] See, for example, Gilbreth, The Psychology of Management; Münsterberg, Psychology and Industrial Efficiency; Scott, Psychology of Advertising.

infrequent in this country, and the development of a new style is discernible. New materials are being employed, and the environment is considered to a greater extent than formerly in the effort to secure a better effect. Most significant of all is the attention that is now given to adapting the building to the purpose for which it is intended. This is particularly noticeable in the case of public buildings, for which the wasteful dome and rotunda are now no longer regarded as essential.

Literature is now undergoing an internal revolution very similar to that observed in the pictorial arts. Free verse is winning a recognition for itself both in this country and abroad, and at the same time is bringing down upon itself the wrathful fire of the conservative critics. This form of literary expression in appearance somewhat resembles ordinary poetry, but has neither rhyme or meter, the latter of which has almost universally been regarded as the *sine qua non* of poetic construction. The new verse is based on rhythmical cadence, although the rhythm is more subtle than that to which we are accustomed. There are several groups of free verse writers, the realists, the fantasists and the futurists, but they differ more in subject than in method, and they all have as their motto "the abandonment of existing forms." A recent writer says that "the coldness of their reception is due in part to the inveterate traditionalism of the human race."[73]

Music is also displaying an anti-traditionalistic tendency. Richard Strauss, acclaimed by many as the greatest living composer, has employed new forms of musical expression and on occasions has shocked the conventionally minded with his frank realism. Debussy is also a realist. He contends that melody is incapable of expressing completely the ranges of sentiment and emotion. The impressionists are composing musical novelties, which are meeting with rather consistent lack of appreciation. There are also futurists in music, as well as in painting, sculpture and poetry, who are experimenting with new forms. Professor Clarke of the University of Pennsylvania in a lecture delivered a year ago said of modernism in

[73] Independent, Oct. 16, 1916. P. 104.

music: "It has enlarged the boundaries and swept away some of the pedantries that hampered music."[78]

From the foregoing discussion it may be concluded that the arts and sciences which have been considered are now undergoing a definite evolution, in some instances amounting to revolution, and that there is a marked similarity in the character of the changes which are occurring in each field. The instances given are too numerous, and the fields too closely interrelated, to justify the conclusion that such similarity is merely a coincidence. On the contrary the evidence seems sufficient to establish that a general movement is now taking place, and that its trend is away from traditional standards, doctrines and rules.

In the case of the sciences the movement is displaying three distinct qualities. It is empirical, pragmatic and social. Principles are now developed from observation and experiment, they are being judged by their workability, and the interests now being increasingly served are those of society. This last quality is evidenced by the new nomenclature—social legislation, sociological jurisprudence, social philosophy, social economics, social service, social justice and social psychology.

[78] University of Pennsylvania Public Lectures, 1915–1916, 454, 458.

THE BASILICA OF ST. PETER IN ROME

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The tradition is that St. Peter suffered martyrdom in 67 A. D. For many years it was supposed that the cross on which he was crucified stood on the Janiculum Hill near the Church of St. Pietro in Montorio and for this reason the little Tempietto of Bramante was erected on that spot. This site was selected because in the old records the martyrdom is spoken of as having taken place "inter duas metas," interpreted as meaning between the two tombs; the Pyramid of Cestius and the Meta Romuli located near S. M. Transpontina. Lanciani claims that "metas' refers to the two pyramids which marked the two goals at either end of the circus built by Caligula and completed by Nero, which was located in the valley between the Janiculum and the Vatican hills and that the actual site of the martyrdom was at the foot of the obelisk now standing in the center of the piazza of St. Pietro, but originally marking the point on the spina midway between these two goals.

Pope Anaclatus is credited with the erection of the tomb of the saint in the grottos of the Vatican hill and it was here that Constantine after his conversion and while celebrating his victory over Maxentius at the Milvian Bridge—two episodes utilized by Raphael in the decoration of the Salle di Constantino —made a vow to erect a basilica over the tomb of the saint.

Constantine was baptized in 234 and eight days later the basilica was begun, the emperor himself digging from the excavation for the foundation twelve spades of earth in honor of the twelve apostles.

The basilica which was constructed in less than a year was consecrated by Pope Sylvester. It was a five-aisled church with a transept and preceded by an atrium or forecourt. Not only were the three north walls of the circus used as foundations

for the new structure, but much of the material is also believed to have been obtained from this monument. As in the case of so many of the early Christian basilicas, fragments from classic buildings were employed in its construction in spite of the fact that they were not particularly suitable. According to a description by Grimaldo, "no two bases or caps were alike, architraves and friezes differed, stones bore inscriptions of the emperors." The roof when it was destroyed in the seventeenth century was found to contain some gilt tiles of the time of Hadrian probably from the temple of Venus and Rome.

The body of the saint was enclosed in a bronze case and the altar above embellished with spiral columns decorated with vines, which, according to the Liber Pontificales, were brought from Greece.

The atrium contained in the center a fountain erected by Pope Symmachus (489–514) consisting of a canopy supported by eight porphyry columns, beneath which was the great pine cone now in the Vatican gardens, believed originally to have come from the tombiof the Emperor Hadrian. The other bronze of the fountain, except the peacocks, which are with the cone, were used by Paul V in casting the statue of the Virgin on the column near S. M. Maggiore.

Nicholas V, the first of the popes of the Renaissance period, began a reconstruction of the west end or tribune, bringing to Rome the Florentine Architects Alberti and Rosellino for this work. The construction had been carried only a foot above the level of the ground when Nicholas died and the work ceased. As these operations, however were entirely outside of the old tribune, it remained completely intact.

In 1503 Julius II was elected pope. His portrait by Raphael shows this great statesman, soldier and patron of the arts who began the operations which finally produced the basilica as we know it today.

One of his first concerns after his election was the design for his tomb, which was entrusted to Michael Angelo. This assumed such dimensions that there was no place in the old basilica in which it could be put. Julius with characteristic

magnificence determined to rebuild the basilica. The architect selected for this work was Bramante, whose early life had been spent in Milan, where he had been trained in the Lombard School of the Renaissance. His coming to Rome after his fiftieth year marked a turning point in his career and the character of his design had undergone a complete revolution, becoming much more restrained and less ornamental.

His scheme, which is known from a medal and from drawings collected by Baron von Geymüller, consisted of a Greek cross with a great dome in the center having clustered about it four smaller domes in the angles.

It is said that his ambition was to place the dome of the Pantheon on the vaults of the Temple of Peace, two conspicuous monuments of the Classic Period in Rome.

There is a certain inspiration to be traced to the plan of the Romanesque Church of St. Lorenzo in Milan and to the plan of Alberti for the Church of St. Andrea at Mantua.

There was great opposition on the part of the cardinals to the demolition of so famous a shrine as the old basilica, but Julius II was not the person to be deterred by this. The western end was torn down, the back of the portion still standing was closed by a wall so that services could still be held there and work was begun on April 18, 1506.

Julius II died seven years later and Bramante survived him only one year. At this time the arches and piers supporting the great dome had only been completed, but we may obtain some idea of what Bramante's scheme for the interior might have been from the architectural background which he drew for Raphael's School of Athens in the Vatican into which the painter introduced the portrait of the architect.

There has been much controversy regarding the arches and piers completed by Bramante. It has been claimed that defects appeared in the arches and that the piers, proving inadequate, had to be strengthened. This would mean that nothing of Bramante's work remained visible in the present building with the exception of the interior order. Geymüller, who has made the most thorough study of Bramante's work on St. Peter's,

identifying many drawings previously not associated with either Bramante or St. Peter's, claims that the arches and piers are substantially as he left them. One of his reasons for believing this is that Raphael, who succeeded him, made studies for a dome even heavier than Bramante's, which would hardly have been the case had he feared for the stability of the piers.

Raphael held his appointment from Leo X, who succeeded Julius and was a member of the Medici family, a son of Lorenzo the Magnificent. Raphael had no training as an architect; his short life had been devoted to painting, and while both Müntz and Geymüller maintain that towards the end of his career he was drifting more and more into architecture, his attitude toward St. Peter's must have been that of the designer dependent upon others for the practical realization of his schemes. This is shown by a letter written by him to his uncle Simone di Ciarla: "Concerning my sojourn in Rome, I can not, for the love of the work on St. Peter's, stay any length of time away, for I have Bramante's commission and what place is more worthy than Rome, and what enterprise more worthy than St. Peter's, the most important shrine in the world? It is the largest building one has ever seen and it will cost more than a million in gold. The Pope is resolved to spend 60,000 ducats a year on the work; he thinks of nothing else. He has given me as colleague a learned 'frate' at least eighty years old; realizing that he cannot live long, he has given me for companion this learned man of great reputation, so that if he has some great secrets in the matter of architecture, I may learn them and arrive at perfection in this art. His name is Fra Giocondo. The Pope makes us visit him every day and discusses with us regarding the structure."

A letter of the Pope relative to Raphael's appointment is interesting. "The greatest of my desires is to see the basilica rise with celerity and magnificence. We therefore burden you with this new charge. Think of your name, for it is wise, even though you are young, to base your fame on an imperishable monument. Remember the confidence we have in your talent, the affection that you had for our father and lastly of the

celebrity and dignity of this august temple. There is none so holy or splendid in the whole world. Do not forget the devotion we all owe to the Prince of the Apostles."

Little was done, however, during Raphael's regime. He was greatly distracted by other matters and at his death in 1520 the work had progressed little.

A design attributed to him shows a scheme employing the Latin cross, a cross having a long front arm, the form which unfortunately the plan ultimately took.

Baldasarre Peruzzi succeeded Raphael and held the appointment during two periods, 1520–27 and 1532–36. The interval comes directly after the sack of Rome by the Constable de Bourbon, when so many artists fled from the city.

Peruzzi, who was a Sienese and a pupil of Bramante, had the good judgment to return to the plan in the form of a Greek cross and has left a design which in the distribution of blacks and whites, or the spotting, is more brilliant perhaps than any other.

In these troubled times, however, the work did not progress rapidly and it must be admitted that Peruzzi's work was mainly on paper. At his death he was succeeded by Antonio de San Gallo, the younger, who had previously built the Farnese Palace for Pope Paul III, who was then reigning.

San Gallo made a compromise between the Greek and Latin cross, adding a great vestibule in front. He prepared a model in wood, still in existence, which was very severely criticized.

Vasari says that Michael Angelo and "many others who saw Antonio's model thought the composition too dwarfed by projections and members, which are small as are the columns, arches being placed upon arches and cornices above cornices." Other parts of the design "he thought approached the German style more than the good antique observed by the best architects."

Michael Angelo, who succeeded San Gallo, held his commission under five popes; Paul III, Julius III, Marcellus II, Paul IV and Pius IV, extending from 1547 to his death in 1564. All of these popes, in spite of the efforts of many jealous factions

to remove him, were loyal to him, with the exception of Marcellus II, who, however, reigned only twenty-one days.

Michael Angelo had established his reputation not only as a great sculptor, which was what he pretended to be, but also as a painter, and it remained for him to produce a superlative work in architecture. He accepted the commission with the understanding that he was to receive no remuneration. He was to serve in this matter "for the love of God, the Holy Virgin, and the Prince of Apostles."

His first step was to return to Bramante's scheme of a Greek cross, in spite of the fact that he had not always been on friendly terms with Bramante. In a letter to Bartolomes Ferrantino he wrote: "It can not be denied that Bramante's talent as an architect was equal to that of anyone from the time of the ancients until now. He made the plan of St. Peter's, not confused, but clear and simple, full of light and detached from surrounding buildings so that it interfered with no part of the palace. It was considered a very fine design, and indeed anyone can see now that it is so. All the architects who have departed from Bramante's scheme as San Gallo has, have departed from the truth, and those who have unprejudiced eyes can observe this in the model."

This criticism of San Gallo's scheme may in part be due to the unfriendly relations of San Gallo and Michael Angelo, owing to the fact that Michael Angelo had been called in to design the cornice of the Farnese palace, a structure which had been designed and erected up to that point by San Gallo.

Michael Angelo simplified Bramante's scheme of the Greek cross and added to the front a monumental portico inspired from the portico of the Pantheon at Rome. He also increased the height of the dome, raising it on a high base or drum and changed the profile of the dome from the segment of a circle to a curve approaching an ellipse.

The work progressed satisfactorily under Paul III, but after his death in 1549 it was difficult to obtain funds. Plots, believed to be due to the friends of San Gallo, were formed to remove him from the work. His attitude toward the structure is almost

pathetically expressed in a letter which he wrote Vassari at the time when the Duke of Tuscany was trying to induce him to come to Florence. "Beg the Duke to permit me to continue the building of St. Peter's until its completion in order that no one may be able to give it another form, for if I depart before this, I shall become the cause of a great ruin, of a great shame, and of a great sin. I ask you to do this for the love of God and St. Peter."

Also in another letter to his nephew, "I should rather die than be in disgrace with the Duke; in all that I do I try to walk according to the truth, and if I delay in coming when I had promised, it is because I had always understood that they would not think of making me depart from here before the end of the construction of St. Peter's. Otherwise they might change or spoil the design which I have made. My departure would give occasion for new thefts, as in the past; many wait only for that to begin. I ought to stay because many persons believe that I am placed here by God, and that I believe myself. But I have not yet succeeded in completing the building, for money and men are lacking. I am old and I do not want to abandon my work. I serve for the love of God alone and it is in Him that I have put my trust."

His reference to thefts and graft is borne out by a letter written to one of his overseers and gives indication of a certain sense of humor. "You know I told Balduccio not to send his lime unless it were good. He has sent bad quality, and does not seem to think he will be forced to take it back, which shows that he is in collusion with the person who accepted it.

"This gives great encouragement to the men I have dismissed for similar transactions. One who accepts bad goods needed for the fabric when I have forbidden them, is doing nothing else but making friends of people whom I have turned into enemies against myself. I believe there will be a new conspiracy. Promises, fees, presents corrupt justice. Therefore I beg you from this time forward, by the authority I hold from the Pope, not to accept anything which is not suitable, even though it comes to you from Heaven."

Owing to various impediments, Michael Angelo's scheme at the time of his death was only a few feet above ground, but he had finally been induced to make a model of the dome, which was ultimately followed. Regarding the rest of his design, he had been secretive and had only given to the workmen sketches for the work immediately in hand. The model of the dome as it exists has three shells instead of two. It is believed by Symonds that the lower shell was abandoned during his life time, but the presence of this lower shell in the model has given rise to the statement, so often made, that the dome was raised by della Porta.

Vignola, who was in charge between Michael Angelo and della Porta has the credit of the small cupola on the right over the chapel of St. Gregory. This chapel was completed by della Porta under Gregory XIII, marbles being used in its decoration which were taken from the temple of Romulus.

When Sixtus V was elected to the papacy in 1585 he provided for the removal of the obelisk which had stood in the circus of Nero and at the foot of which the martyrdom probably took place, to the center of the piazza in front of the church. Domenico Fontana won this commission in a competition of fifty architects.

It is in connection with the erection of this obelisk in its new position that the story is told of the sailor who cried, "water on the ropes" when they were stretching, in spite of the command of silence made by papal decree. He was forgiven for this disobedience and granted the request that his native town should supply the palms for the Palm Sunday service in St. Peter's. This story does not appear in Fontana's book, in which he describes at length the transportation of the obelisk, possibly because it would not have added to his reputation.

Sixtus also determined to complete the dome according to Michael Angelo's model and placed della Porta in charge of the work.

The construction of the dome was begun July 15, 1588, and finished December 17, 1588. An old print shows the construction at this point. The dome was begun December 22, 1588,

and finished in May, 1590. A period of seventeen months, as against ten years which had been estimated. It is said that six hundred skilled men worked night and day, being excused from divine service on feast days, Sundays excepted. The last stone of the dome was laid on the tomb of St. Peter before being lifted into place. Some idea of their haste in the erection is indicated by the fact that the tomb of Urban VI was emptied of its contents and used for a water trough by the workmen.

The architecture of Michael Angelo has been severely criticized, but in regard to the dome of St. Peter's there is only one verdict. Charles Garnier, the architect of the Opera House in Paris, in his monograph does not hesitate to accuse Michael Angelo of being ignorant of the language of architecture. "He had," he says, "the force, the bigness, the will and the personality which makes the great designer, but he does not know the grammar—it is doubtful, in fact, if he even knows how to write." Even Garnier, however, gives the dome the greatest praise. "It is the curve of the cupola," he says, "which charms and gives to this structure majestic harmony; it is this curve which has been studied so often and called a catinary, a parabola, an ellipse, but which, partaking of the nature of all of these, is really an inspired line which one must pronounce born of genius."

To get a view of the dome which gives an idea of the way in which Michael Angelo really intended it to count, one must go to the back of the church, where the great success of the composition of masses can be realized.

Under Clement VIII the lead was put on the dome, the lantern added and the interior of the dome decorated by Fontana.

The eastern end of the old basilica was still standing but was unsafe. The walls, particularly those built on the walls of the circus, were leaning from the perpendicular 3 feet 7 inches and a priest while saying mass had been struck by a falling stone. To dispose of so venerable a shrine required some courage and Paul V summoned a consistory to authorize it. The demolition began February 21, 1606. At this time it was determined to extend the nave of the church three bays and add a vestibule with a loggia above, from which the papal benediction could be

given. The reasons for this extension was not so much the desire that the plan should have the form of the Latin cross—many churches of Western Christendom employ the Greek cross in plan—but rather the desire that the new structure should cover all the area of the basilica of Constantine.

Michael Angelo's portico was consequently abandoned and a competition in which nine architects competed was held for the added portion and a new façade. This competition was won by Carlo Maderno, whose uninspired façade was completed in 1608.

Maderno also began the revetment of the interior with colored marbles and erected the northern fountain in the piazza, destroying an old fountain of Innocent VIII and Alexander VI, from which he took the red granite basin forming the upper basin in the present fountain.

The new basilica was consecrated on November 18, 1626, by Urban VIII, who also commissioned Bernini to replace the wooden baldacchino over the high altar by a bronze one. There was at first considerable opposition to this, as it was claimed that the foundations could not bear so great a weight; it was completed, however, after nine years, but it is not, according to Lanciana, made of the bronze from the ceiling of the porch of the Pantheon, as is so often stated. All of that, it appears, was used in making cannon. The bronze for the baldacchino came from Venice.

Bernini also built a bell tower on the left side of the façade and decorated the great piers under the dome with balconies from which relics could be displayed. For the embellishment of these he used the twisted columns which had adorned the shrine in the church of Constantine.

The relations existing between Bernini and Urban VIII were similar to those of Michael Angelo and Julius II. In a letter from the Pope to Bernini he says, "It is fortunate for you that Maffaeo Barberini is Pope, but far more so for us that Bernini is living under our pontificate."

Urban died in 1644 and was succeeded by Innocent X. It was claimed that Bernini's bell tower was causing a settlement in the walls of the basilica. Bernini's first intention on hearing

this charge was to rebuild the tower at his own expense, an operation which would have exhausted all his resources, but on the advice of his friends he decided to accpet the disgrace and flee. His years of exile were spent in working on the tomb of his former patron Urban VIII. Finally he won the favor of Donna Olimpia Pamphili, sister-in-law of the Pope, who was instrumental in getting his design for the Piazza Navona accepted. Bernini was not invited to the competition, but he made a design which the Donna Olimpia placed in a conspicuous place in her palace where the Pope could not fail to see it. When the Pope saw the design he said, "Do what you will, it is impossible to pass over Bernini, if you do not wish to carry out his works, you must never see them." This brought about his restoration to favor which lasted to the time of his death thirty-three years later.

He was made director of the work on St. Peter's and completed the marble revetment of the interior, the statues in the spandrels of the arches and the pavement, all of these being finished for the Jubilee in 1650. Alexander VII commissioned Bernini to construct the great colonnade bounding the piazza in front of the church. Many schemes had been made for this; Bramante, Michael Angelo and Maderno had all worked on it. The form selected by Bernini was an ellipse, the colonnade being formed by four rows of Tuscan columns surmounted by a balustrade and statues. The florid character of the design of this period is betrayed only in the dramatic attitudes of the figures surmounting the colonnade. Otherwise it is as severe and restrained as Bramante himself would have made it. This eminently successful approach leads the eye away from Maderno's uninspired façade and to some extent softens the disappointment of one's first visit to the church. It was completed by Clement IX.

Clement X finished the erection of the fountain on the south side of the piazza, making a symmetrical arrangement on the vertical axis which is 1,100 feet from the door of the church to the entrance of the piazza. Finally, the building of the sacristy in the eighteenth century by Carlo Marchioni brought the structure to its present state of completion.

ADVERTISING: A DETERMINING FORCE IN OUR NEW BUSINESS RELATIONS

By Herbert W. Hess

Professor of Commerce

In order quickly to appreciate the all pervading and effective force of advertising, let us imagine ourselves taken up the heights of a mountain peak, and there look out upon the varied interminglings and strugglings of economic humanity. Our penetrating eye, in this economic struggle for an existence, profit, and individual power reveals varied degrees of expression. Far back in the perspective of economic history we see, in simplest form, the creator of some product selling his ware by direct personal dealings with others. It is in an age when intercommunication and modern transportation are unknown. It is an age when pure force of personality selling its wares, cries out to the passing public, "What d'ye lack? What d'ye lack?" It is at a time when the extreme inventive genius of man is still dormant. The wand of personality-expression has not yet touched the landscape of life to dot it with the multiple of useful, comfortable and beautiful things which go to make up our twentieth century civilization. As yet the idea of bath tubs, hot and cold water, electric lights, refrigerating plants, automobiles, submarines, 42-centimeter guns, Bethlehem Steel plants, Pullman coaches, and Wanamaker department stores had not been called into existence. As yet the power of the written word in creating sentiment for or against things or propositions is comparatively latent. People *en masse* are but beginning to try to read. The ultimate significance of reading and its practical universal application in creating sentiment had not dawned upon humankind. Bibles are still chained to public posts. The power that unites masses of peoples in quick sameness of thought is still hidden. Numerous "things" consequential to twentieth century civilization are unborn,

the effects of which upon life are not even imaginable to the struggling humanity of this early period.

In that bygone day of early Western civilization "things" were fewer in number and often a result of weary man-made care and craftsmanship. But even this age produced its masters, whose hands worked with a will, whose souls almost tenderly struggled with matter in giving beauty of form and usefulness of purpose to the ideals of their thinking. In that bygone day, with humanity groping upward, toward what it knew not, the individual, by the very force of evolution, became master of his community through excellency of skilful workmanship. But the spread of his limited output through an undeveloped system of distribution reached but a comparatively limited number of possible consumers.

The time came, however, when the genius of individual effort burst forth into another concept regarding its happiness. It was that a thought is a "thing." The power of the symbol and the written word began to manifest itself to human intelligence as a means of economic conquest. The newspaper sprang into being and began to exert its power, first as an advertiser, then as a news gatherer. The right thought set going in the minds of humanity relative to the use of a single thing meant the arousing of desire, the change of habits, and the ever-increasing output of that particular thing until all of life is seen to be enriched by its presence. And in spite of the individual element of selfishness relative to the development of new things ushered into economic environment; instead of the continual birth of new things resulting in pauperism and misery on the part of those merchants or manufacturers who were displaced by these constantly newer things, we have a greater and greater increase of all things. For each "thing" that is worthy of the name of a thing, born into the economic world, is found to have a definite place in the life of developing humanity. The candlestick once served a most useful purpose. With the passing of time and the change of economic history, the candlestick, no longer useful, serves as an ornament of decoration, and it is said that there are more candles and

candlesticks manufactured today than ever before in the world's history.

Thus as we stand upon this high mountain peak, looking back in history at the significance of economic development, we find constant change manifesting itself relative to the growth of our so-called economic civilization—from simplicity to complexity; from a change of habit, custom and tradition to that which is constantly new and untried, and, withal, an ever unfoldment of individual expression in the use and ownership of things into planes of consciousness, higher and higher related to the ever-widening consciousness of greater human experience. And this force, which drives people on toward a constantly higher plane of expression, a force which relates men, women and children to a higher individual ideal standard of development, this force but reacts upon the city of which they are a part, the state of which they are a part, the country of which they are a part, until a common ideal of human possibility of "thing" exchange, enjoyment and development is resultant in a state of mind which struggles for appropriate state and federal laws, which laws in turn seek to give equity to manufacturer, consumer and middleman.

If we analyze the force which draws us slowly but surely away from the past and projects us slowly but surely into the future, we shall find that a part of the momentum producing significant economic changes throughout centuries of human experience can be attributed to the persistent force of advertising in its varied forms.

Sentiment for the new or for another realm is always in the making. With a study of humanity in its whims and caprices, habits and traditions, ideals and customs, advertising has been an all penetrating force in the introduction of the new or competitive standards of living. With a study of the crowd advertising has erected billboards, made possible a universal newspaper, sent its influence by means of letters, street car cards, show windows, demonstrations, trade papers, electric signs, circulars, booklets, posters, public lectures, modern housewife boycotts, and the future knows not what.

Advertising as a force is just beginning to come unto its own. It is beginning to be recognized as an all-powerful agent in wielding the sentiment and opinion of men, not only in the sale of a specific article of merchandise, but in molding the sentiment of people with regard to the vast changes within our economic system, which relate to ideals of common development. These so-called environmental ideals themselves spring out of the use, abuse and desire for "things" relative to the life of the individual or community. To get sentiment for a thing through advertising is one step in selling goods. The effect of the use of this article is another phase of human experience which might be said to be the creative factor within all successful advertising. Advertising is but the seed containing the germ of a most varied unfoldment. To be specific—the direct result of automobile advertising resulted in sales; the effect of automobiles as a definite human experience has resulted in an ever widening appreciation of better roads, special styles of clothing, competitive automobile tires, gasoline service stations, special truck services, new electric appliances, etc. Each of these added complex experiences claims advertising as the means of increasing knowledge of these things. Thus advertising is a faith-creating factor whose force seems never expended, but which brings constantly greater expression on the part of developing humanity.

The persistent force of advertising is to arouse desire, to readjust old-time relations and to realize a constantly changing and new environment for mankind. It has often been suspected of being an evil force in business. But the true mission of advertising relates to the constant adjustment of things to the ever changing ideals of mankind. From the moment of its recognized power there seems to have been a feeling of condemnation regarding its effect, rather than an increasing appreciation of its principles and the significance of its effect upon life. It is only within the last few years that we have had men who have been willing to surrender themselves to this field of human activity to the point of attempting to evolve the science of its expression.

If we go back into the realm of advertising, into the time of the birth of the newspaper, where advertising first appears in its most significant form, and read these advertisements, it seems to me that we can get no better picture of the type of thinking in which men and women were involved, relative to the force of advertising. And as I quote these advertisements of early English you will observe that the advertisements of any particular period of time, if analyzed carefully, tend to show the stage of progress, thinking, competitive bitterness, and the practical ethical standards of that particular age. If advertising during any period of time reflects selfishness and ignorance, it but reflects the practical and the competitive, and in a true sense the actual stage of economic development rather than the ideal. That humanity has improved in its practical relations needs but a comparison of the advertisements of the early sixteenth and seventeenth centuries, with those of 1916.

I quote the following advertisements:

If any person out of natural curiosity desire to be furnished with ships or castles in the air, or any sorts of prodigies, apparitions, or strange sights, the better to fright people out of their senses, and by persuading them there are strange judgments, changes, and revolutions; hanging over their heads, thereby to persuade them to pull them down by discontents, fears, jealousies, and seditions; let them repair to Ben Harris, at his shop near the Royal Exchange, were they may be furnished with all sorts and sizes of them, at very cheap and easy rates.

There is also to be seen the strange egg with the comet in it which was laid at Rome, but sent from his Holiness to the said Ben, to make reparations for his damages sustained, and as a mark of esteem for his zeal and sufferings in promoting discord among the English hereticks, and sowing the seeds of sedition among the citizens of London.

Mr. Benjamin Ferrers, Face-painter, the gentleman that can't neither speak nor hear, is removed from the Crown and Dagger at Charing Cross into Chandois Street, next door to the sign of the Three Tuns in Covent Garden.

An admirable confect which assuredly cures Stuttering and Stammering in children or grown persons, though never so bad, causing them to speak distinct and free without any trouble or difficulty; it remedies all manner of impediments in the speech or disorders of the voice of any kind, pro-

ceeding from what cause soever, rendering those persons capable of speaking easily and free, and with a clear voice who before were not capable to utter a sentence without hesitation. Its stupendous effects in so quickly and infallibly curing Stammering and all disorders of the voice and difficulties in delivery of the speech are really wonderful. Price 2*s.* 6*d.* a pot, with directions. Sold only at Mr. Osborn's Toyshop, at the Rose and Crown, under St. Dunstan's church Fleet Street.

Loss of Memory, or Forgetfulness, certainly cured by a grateful electuary peculiarly adapted for that end; it strikes at the primary source, which few apprehend, of forgetfulness, makes the head clear and easy, the spirits free, active, and undisturbed, corroborates and revives all the noble faculties of the soul, such as thought, judgment, apprehension, reason and memory, which last in particular it so strengthens as to render that faculty exceeding quick and good beyond imagination; thereby enabling those whose memory was before almost totally lost, to remember the minutest circumstances of their affairs, etc., to a wonder. Price 2*s.* 6*d.* a pot. Sold only at Mr. Payne's, at the Angel and Crown, in St. Paul's Churchyard, with directions.

Whereas several persons who sell knives, for the better vending their bad wares spread reports that Ephraim How, Cutler of London, is deceased. This is to certify That he is living, and keeps his business as formerly, with his son in partnership, at the Heart and Crown on Saffron Hill; there being divers imitations, you are desired to observe the mark, which is the Heart and Dagger, with How under it.

It is my custom, in a dearth of news, to entertain myself with those collections of advertisements that appear at the end of our public prints. These I consider as accounts of vews from the little world, in the same manner that the foregoing parts of the paper are from the great. If in one we hear that a sovereign prince is fled from his capital city, in the other we hear of a tradesman who has shut up his shop and run away. If in one we find the victory of a general, in the other we see the desertion of a private soldier. I must confess I have a certain weakness in my temper that is often very much affected by those little domestic occurrences, and have frequently been caught with tears in my eyes over a melancholy advertisement.

But to consider this subject in its most ridiculous lights, advertisements are of great use to the vulgar. First of all as they are instruments of ambition. A man that is by no means big enough for the Gazette may easily creep into the advertisements; by which means we often see an apothecary in the same paper of news with a plenipotentiary, or a running footman with an ambassador. An advertisement from Piccadilly goes

down to posterity with an article from Madrid, and John Bartlett of Goodman's Fields is celebrated in the same paper with the Emperor of Germany. Thus the fable tells us, that the wren mounted as high as the eagle, by getting upon his back.

A second use which this sort of writings have been turned to of late years has been the management of controversy, insomuch that above half the advertisements one meets with nowadays are purely polemical. The inventors of "Strops for Razors" have written against one another this way for several years, and that with great bitterness; as the whole argument *pro* and *con* in the case of the "Morning Gown" is still carried on after the same manner. I need not mention the several proprietors of Dr. Anderson's pills; nor take notice of the many satirical works of this nature so frequently published by Dr. Clark, who has had the confidence to advertise upon that learned knight, my very worthy friend, Sir William Reed: but I shall not interpose in their quarrel: Sir William can give him his own in advertisements, that, in the judgment of the impartial, are as well penned as the Doctor's.

The third and last use of these writings is to inform the world where they may be furnished with almost everything that is necessary for life. If a man has pains in his head, colics in his bowels, or spots on his clothes, he may here meet with proper cures and remedies. If a man would recover a wife or a horse that is stolen or strayed; if he wants new sermons, electuaries, asses' milk, or anything else, either for his body or mind, this is the place to look for them in.

Thus advertising, with regard to its degrees of insistency relative to the life of changing humanity is in its lowest form, to be reckoned as a force set going by a given individual or group of individuals relative to the sale of a particular article or proposition, which involves the idea of profit.

On the other hand, advertising in its broadest concept, changes its name to that of "publicity." Publicity as a force in its power upon humanity at large contains in its complete expression all of the principles involved in so-called individualistic or profit-making advertising and more.

Advertising relates to the creation of individual standards of living. As a result of "things" becoming standardized, the community or nation demands distribution under fair conditions. Advertising then changes its form to a campaign of publicity, the purpose of which now is to change the economic conditions so that all may enjoy, under fair conditions, what

advertising often first proclaimed as a luxury, but which eventually comes to be regarded as a necessity. So publicity in its broad sense, while containing the working principles of advertising in developing its power, has a different mission to perform. Publicity enters our economic system as a factor in determining the environment in which man is to live. Publicity is no respecter of persons, but is limited to those things or factors which relate to the progress of all. Exposures of individual selfishness or monopolistic peril, dishonesty or hypocrisy, as well as constructive agitation for that which is for the common good—all these are the limiting channels of its expression. Advertising principles but gauge the energy and art of its expression in getting the message intended before the public.

Let us examine somewhat the significance of advertising as a force in connection with the various fields of its expression, and likewise draw conclusions with regard to its effects in helping to determine changes in the future. Before doing this, however, let us have a very definite idea of the true significance of advertising. Creative advertising involved in selling has been effective in a threefold effect on human affairs: one is economic, in that increased selling has wrought a considerable change in business systems related to the distribution of goods; the second is individualistic in its creation of changing standards of living; the third is social, in that the desires of people once standardized have created new relations and standards of living.

Advertising, again, in its large sense, involves the reaction of four decided forces in realizing itself as a definite power in the economic realm: Desire, the advertiser, an article or proposition, and humanity to whom to sell. Let us turn our attention for a moment to each of these factors.

If there be one word which accurately suggests the significance of human nature in its conquest of things, that word is desire. From the cradle to the grave our lives are ever reaching out trying to absorb, to possess, to regulate, to suppress, to attain, to feel; all these, and more, based on the

desires of life born out of manifold experiences. If we stop to analyze the function of selling, we find it to be based primarily on our desire to possess things, or, in modern phraseology, "to get over" our proposition. The majority of mankind desires automobiles, vacations, stylish clothing, homes, travel and whatsoever else seems to be found harmlessly pleasurable and useful. And it is here that desires become dangerous to society, for we often wish for those things or those conditions that put us into an unnatural obligation to others. It is this maladjustment of selling relations which brings on our present "boycott methods" against high prices. Now advertising and salesmanship are intimately and directly related to our desire for things. And if the advertiser and the salesman is persuaded that the world is to be made happier, or a more convenient place in which to live, or more beautiful because of the possession of his article or proposition, then, it naturally follows that his goods should be distributed under such economic conditions as will permit all worthy people to enjoy these manifold experiences. In so far as our selling system retards distribution to worthy people, just to that extent is it the seller's duty to take his part in a struggle for a new economic system.

Thus I would characterize the work of the advertiser as twofold: first, to educate and create desire on the part of the class or classes for which his object or proposition is intended; second, to consider himself a factor in the changing of our economic system so that all who would be really benefited should have the opportunity of rightly buying what he has to sell.

That advertising has yet a mission to perform in the creation of new standards of living, is excellently illustrated in the following Pittsburgh story:

Mrs. Non-Do-Well had worked for Mrs. Do-Well for many a year. But war prosperity swept the land. Mrs. Non-Do-Well's husband and boys began to make a surplus. One morning Mrs. Non-Do-Well accosted Mrs. Do-Well thus: "Mrs. Do-Well, I hates to tell you, but since the war started

our house has made so much money that, try as we would, we can't spend it all, so we had to put some in the bank; so I can't work for you any more."

While the immediate functioning factors of advertising are essentially educational in nature, the desired culmination of their operative processes is for the purpose of creating what we might term *a vogue* for a particular article or proposition. By vogue we mean a favorable attitude of mind on the part of a desirable group or groups toward a particular article or proposition. To put the processes of the creation of a vogue in another way, advertising, when thrust out into the realm of human sensitiveness, attempts: first, to attract attention; and second, to establish a feeling on the part of individuals that this particular article has a place in life. When a sufficiently large group of individuals has acquiesced to the appeal of the advertiser in a feeling that the article's or proposition's *raison d'être* is worthy, and the seller likewise feels that enough of the salable has a recognized value, then the vogue has been established. Thus, with respect to the history of any proposition, there seem to be two distinctly developing movements: one, which involves the creation of a vogue; the other, the maintenance of a vogue.

Let us regard for a moment the significance of a "thing" in life's experience.

There are certain factors which culminate in the birth of a thing. One might be termed its utilitarian value. An article should have relation to mankind in the service which it performs. If an object is found functioning in the service of man, a second factor, or environment, has entered into a discussion of its birth.

A given environment contains a set of working factors which creates, in the mind of some one, a feeling of need. This need is expressed in the form of an idea which, made practical, results in a concrete thing. Thus environment has aroused a feeling of need on the part of some one who satisfied this need by creating what he calls a useful thing.

But still another factor seems to control our appreciation of

a "thing" world. This is emotion. Not only do we like an adjustment to our need, but we wish a nicety of adjustment. We wish to be pleased. We have come to regard mere creation as the first step; we speak of it as necessity. We now regard the added emotional pleasure which pleasing form, color, weight and right placement give, as the final test of its *raison d'être.*

The three factors—environment, utility and emotion—are to be found vying with each other for equilibrium in the birth of an object or article. When their relationship is properly adjusted, the particular class for whom the article serves is satisfied, and those thus served come to look upon it not only as a part of the environment, but as needful and emotionally pleasing.

This law of adjustment pertaining to the birth of a thing is ever working. The Stetson Hat Company sells different hats in the West than in the East. The cowboy hat of the Western plains is not that worn by a New Yorker. The clothes worn at a picnic are likely to differ from those worn at a White House reception. The limousine car has its place quite as much as a little Ford that climbs the veriest hill. Lawn tennis has developed a suit popular unto itself as has the game of baseball or of football. In all the instances cited and in any article named, need, environment and emotion are found harmonizing themselves into the creation of a thing.

Competition between things serving a similar purpose is often based on the emotional factor or, again, on the superiority of utilitarian adjustment to the felt need. The interpretation of the environment out of which an article has come might have resulted in a better emotional appeal by one concern in competition with another. For an article born into the thing realm cannot be separated from the classes of humanity which it is to serve. It is the work of the advertiser to study changes of opinion as well as to create opinion, always bearing in mind that he is to adjust and so to regulate and so to change his particular article, or the public mind, or the conditions of environment, or all three, that in an exchange

of human values money is turned into the cash register at a profit. What constitutes a fair profit or why the profits on different articles should vary from time to time, or the extent to which competition has a right to begin to cooperate in selling in order that all might be benefited, for instance—consumer, seller and community—all these are questions vital in the life of successful advertisers. To preserve one's equilibrium and yet to change in order to meet new conditions, is the law to be observed by those who recognize the necessity of self-preservation in a progressive or even a declining economic realm.

It is conceivable that David Harum, away back in the country could invent a new apparatus for drawing water from his well, without considering it worth while to others. But the economic man would immediately imagine the whole universe using that newer method of drawing water. He would become more and more possessed with the idea that the world ought to use his method. After convincing himself that the method was superior, he would perhaps have the idea patented. After due process of time he would begin manufacturing the apparatus. With smiling countenance and hope, he steps forth to sell.

Presto! Alas! What is the matter? Somehow, humanity does not rush forward to call him blessed. It stands back. Some admit that it looks good; others seem to doubt its efficiency; there are still others who scorn it; yes, there are even those who declare that they would not take it were it given to them. What is he to do? To continue? Of course! Humanity was ever so.

That selling means force is generally admitted. The seller stands on one side of an imaginary line, the crowd on the other. The seller is trying to get the crowd to give money for his article, but humanity often will not buy with the mere display. Then it is that the advertiser begins to study this mass of humanity. What does he find? First, that men, women and children are subject to varied expressions, but their expression is always according to fixed law. He analyses closely

enough and names their ways of acting—habits and instincts. Custom, tradition and precedent vie with other qualities in an attempt to keep the crowd from recognizing his proposition. But he also discovers that these same people are plastic by nature. The young are more susceptible to influence than the old. Constant repetition and reference to the past, with persuasion and reason at work, seem to affect the old. Appealing to the fanciful, the novel, the unique, and feeling in general, as love, grandeur, reverence, sublimity, serenity, humor, pathos and the beautiful—these are means of getting the youth. And each class of society can be appealed to differently.

Under the old competitive system business men were seen cutting prices, with advertising as an aid in self-preservation. The extreme of this particular method of out-doing a competitor is now characterized by the expression "cut-throat competition." But intensive competition, as such, tended to carry in its wake considerable destruction, with only the strongest surviving. A new method of conducting business affairs has developed, with a tendency toward cooperation, yet with a suggestion of monopoly, and the results have been a gradual tendency toward the standardizing of goods. Cooperation has resulted in gigantic business enterprises, with its promoter made the center of all eyes. Credit has been given him for his successful manipulation of funds and his successful control of human ability in the creation of trusts and monopolies. The result of this organization has had a twofold effect upon selling: first, a tendency to stifle competition; second, a tendency at times toward price maintenance. As competition has been stifled so as to insure a steadily increasing output and at the same time an increase in profits, the producer has come more to consider the necessity of standardizing his product. The ability of a single concern to turn out great quantities of goods for people scattered over the entire country necessitates a recognition of the value of creative advertising to which the business world has readily responded. But it is the reaction of the public, involving justice as in the feeling of too high prices or undue exclusiveness, as a result of these

recently formed habits, which tends to force change in our distribution system.

Thus, again, as we stand on the mountain peak, overlooking ambitious, struggling, surging, economic humanity, we find that thought becomes a thing when advertising is employed to introduce articles or propositions to humanity. Again we recognize, first, that accordingly as we enter into consciousness of a thing realm we deal with human beings; second, that growth implies an acceptation of those things which create a more harmonious sense relationship; third, that acceptation of these various things implies power of adaptability. The mind of the public must be educated into desire through such tendencies as curiosity, desire, instinct, suggestion, imitation, and the bizarre, resulting in feelings of necessity or initiative acts.

One of the most significant developments springing out of the persistent use of advertising, and which affects every phase of selling—the manufacturer, salesman, wholesaler, retailer, salesman and consumer—is the concept of truth adopted by the Associated Advertising Clubs of the World—"Truth in Advertising." The uncertain conditions of the American business world at the present time in its concept of honesty relative to truth, merely emphasize the general theory advanced that honesty is a varying characteristic, the functioning of which has not yet been fully determined in all departments of business expression. The present criticism of the solution of honesty in selling is that business men even in their attempt to be honest, are still selfish in their attempt to develop this characteristic. It may be that selfishness will always modify the influence of honesty in the business world, at least it would seem to be dominant in so far as the present economic system is decidedly competitive in nature rather than the spirit of pure cooperation which at times seems to suggest realization. For honesty operating in a competitive realm does not always encourage a complete scientific distribution of all goods, but more and more, as the inevitable force within advertising exerts itself, dominated by an ultimate concept of truth, we shall find the idea of guarantee, honesty, quality and service

dominating. To these concepts modern business must bow. Those who cannot adjust their articles or propositions to these concepts, in actually serving the public, will be met by commission upon commission growing out of the conflict, whose purpose will be to try to determine a fair price to the consumer for the article which has been sentimentalized or made popular in the life of the community, and which the community demands because the thing or proposition which has been sold has become indispensable to its happiness and progress. The man who cannot compete on this kind of a basis must shut up his shop and move away. If he is to survive, it is necessary that he show the public real service.

If there is one judgment which is to characterize the significance of the present economic struggle in which the wide world is now engaged, it is that modern business is to be characterized as emitting a spirit which is the result of larger and ever-increasing organization. Masters in business under the ever dominant idea of still larger profits, reach out through organization not only into distant countries, but into the far future. The result of greater organization is that the speed thus developed is determining the future of our economic history. Where labor and capital once stood at opposite poles of expression, there is now an insistent law working which determines that there be not strife but coordination of efforts relative to the ideal of progress which both hold in common.

Personally I feel that the force of advertising, as it has been expended in the past in training people of all classes into an appreciation of the recognition of the use and value of the products of our intellect, is likewise a force which will tend to unite through greater appreciation of each other, these various classes of society. This is well brought out in an editorial of the *Telegraph*, where W. S. Carter, president of the Brotherhood of Railway Fire and Engine Men, delivered an attack upon the integrity of American newspapers during an address before the Convention of the American Federation of Labor, at Baltimore. He claimed that the cause of the wage earners was not impartially presented in the newspapers. He said that

the introduction of the penny paper has done more than anything else to place the press under the domination of advertisers. This is the statement:

> Unfortunately labor has but little to do with advertising. Practically all the advertisements come from the master class. I have [he says], positive evidence from one of the leading advertising agencies that provision was made to advertise in 3,000 daily and 14,000 weekly papers. Think of it, many millions of dollars worth of advertising to prejudice the public against a brotherhood.

This statement merely intimates a recognition of the fact that advertising is a powerful force in the wielding of public opinion. The public has advanced intellectually to the point where it is responsive to sentiment not only regarding the purchase of particular articles or propositions, but where it recognizes the kind of message which promotes its own class interest in its enjoyment of things. As intimated by the *Telegraph* editorial, a statement of this kind is much more conclusive evidence that a wholesome change has come over the educational methods employed by large corporations, and it is not the spirit of advertising which is to be condemned when it attempts thus to get an idea over before the mind of the public, so much as it is that truth must be told relative to advertising and relative to whatever movement is involved, be it labor, capital or the middleman. To place facts before the people which involve the good of the people, is advertising pure and simple. Publicity, as this kind of advertising is called, thus becomes one of the strongest forces involving advertising space for the exposition of social, industrial and political issues.

Let me quote the *Telegraph's* comment upon Mr. Carter's statement:

> The time was in this country when the people were believed to have no rights to the facts concerning the corporate control, that control holding the view that its full duty was accomplished when it had satisfied the desire of stockholders for dividends. That was an era of improper influence applied to legislatures and courts for laws and decisions favorable to those in a position to bring the greater pressure to bear.

For the time the public remained unconscious or indifferent to these practices and their demoralizing consequences to our Democracy, but the day came at length when the people purged their courts and legislatures of such evil influences, demanding that issues between rival groups be thrashed out in the open, where the most interested element, the public, might perceive the facts and act upon them.

Mr. Carter's charge of servility against newspaper publishers falls flat before the fact that the advertising columns are open to both the employers and the labor unions. The country has surely not forgotten how freely and effectively the Railroad Brotherhood availed themselves of advertising space during their public debate with the railroad managers in August.

Again, organization in its problems recognizes that constant sentiment must be created if growth is to be persistent, and growth depends upon an harmonious relationship of consumer, manufacturer and distributor. This is well exemplified by the following headline which appears:

MANUFACTURERS ASK EDUCATION ON TARIFF.
HOME MARKET CLUB THINKS SOUTH SHOULD SUPPORT PROTECTION.
THE DESIRABILITY OF A BROADER WORK OF EDUCATING THE AMERICAN PUBLIC IN DOCTRINES OF REASONABLE AND ADEQUATE PROTECTION OF LABOR AND CAPITAL WAS EMPHASIZED AT THE ANNUAL MEETING OF THE HOME MARKET CLUB TODAY.

The address of W. H. B. Dowsee, president, emphasized the need of a continuous tariff education and declared that the South should be urged to support protection. Expert and publicity men are herein united to gain sentiment and establish new standards of action. These actions in turn create better living and more prosperous conditions for all.

The Philadelphia Underwriters Association is catching the full significance of the spirit of advertising when they present to the public a series of advertisements which relate not to the sale of specific policies in connection with specific companies, but to an education of the public in general relative to the significance of insurance, as such, in the lives of careful think-

ing men and women. Here we find each competitive company surrendering its identity as an individual to the significant truths of life insurance in general. The far-seeing advertiser knows that if the facts be effectively presented, the public in general *must* catch the significance of insurance, and that the cumulative effect of this kind of education direction will serve all companies.

Again, the force of large organization is world-wide in its effectiveness, as is seen in the instance of the Continental and Commercial Trust and Savings Bank of Chicago projecting its demand for a $5,000,000 loan on the part of the Republic of China. As a result of the force of advertising there is immediately set up a spirit of good will between two countries, a feeling of mutual benefit, and a feeling of mutual respect. A feeling of possible brotherliness is called into play. People begin to visualize oversea relations and a bond of sympathy is struck between the nations.

It is at this point that the smallest advertisement of past dealings becomes significant in the control of sentiment. For any American advertisement which has previously employed deception to sell its goods to a foreigner has sentimentalized the American as a trickster. Truth in advertising, howsoever large or small, is truly the creator of world-wide standards. Concepts of honesty and truth thus act as a stabilizer when difficulties are suggested. The ethics of our evolving economic era become valuable in a system of mutual consideration.

Another headline in the paper reads: "Selling Crops by Cooperation." Here advertising is not to be recognized as an appeal to public sentiment for the purchase of a specific article or proposition, but it is the education of groups of people for the establishment of markets for all sorts of crops, which means that the southern farmer can not only raise his own foodstuffs at home, but can raise sufficient foodstuffs for market to pay his own running expenses, thus leaving the cotton crop entirely as a surplus money crop.

This is a system which has been preached by agricultural and economic theorists in the South.

Observe that this is another form of general publicity. It reveals the scientist, individual, and consumer grappling with a problem the solution of which means mutual benefit: publicity enters as a force to adjust relations.

Too narrow a view of the meaning of advertising is often given. As intimated by this cooperative movement in its educational demand, advertising is education, but an education involving advertising principles relative to the sentiments that need to be created if we are to put propositions over which involve a universal economic progress. Advertising as a force relative to the demands of a situation will vary in its expression from intensive personal selfishness to the wielding of sentiment regarding universal benefit or gain.

The master advertiser is he who looks out upon the world in its present state of development and creates that kind of sentiment relative to any working situation which insures the stability of what is worthy of preservation, the distribution of that which is largely beneficial, and who determines, howsoever small, the future tendency or direction of all which is to be characterized as scientifically progressive and mutually helpful to mankind.

It is the larger spirit of advertising alone that could produce the following kind of a paragraph, whether we agree in the judgments or not:

> If we would take seriously the gospel of health, of faith, of service, and of cooperative organization, there is absolutely no reason why a workman need be idle after this war is over. Talk about business not being affected by religion. Statistics clearly show that the great percentage of our business prosperity is wholly a matter of religion. But we must approach men scientifically, and the implication is that if we approach men scientifically relative to the change of sentiment and with respect to the business of the future, there is no reason why a single wheel need stop turning or a single man be unemployed. Those now engaged in making munitions should make something else.

Of all individuals who exist in the business realm, the advertiser is to be considered as one who possesses great faith relative to the future. It is the advertiser who is to proclaim the hope of an individual concern, of a large corporation, or of a national

ideal. It is the advertiser who projects out into the minds of people the hope of greater individual happiness, accordingly as we can produce at a surplus. At the same time there are men and women to be found throughout the world who do not possess our articles, propositions or ideals, but who ought to possess them if life is to be more nearly in harmony with environment. Just to the extent that our common ideals are based on a scientific analysis, is it possible for the wheels of business to continue moving to supply all wants. And just as war is an exceedingly dominating ideal to some, the concept of which revolutionizes each kind of business in every country, each individual finding himself forced to adjust himself to the needs of the concept of war, so in times of peace, if we create an overmastering concept which involves universal distribution in the spirit of cooperation under scientific, artistic or cultural analysis relative to the production of all things, by these larger concepts we revolutionize not only human relations but business activities. By blending the new and strange systems of thought with the old we establish the possibility, first imaginatively, and then practically, for an entirely different world of creative economic activity.

A new system of relations and exchanges then ensues. At the present moment we are witnessing the boycott against food products. Every boycott aimed at lower prices is to be classified as unique advertising in the creation of sentiment for another system of distribution. The boycott is injecting the concepts of truth and justice in relations involving seller and buyer. The force of advertising is again imbued with the very spirit of democracy to the exclusion of the spirit of "the public be damned." Numbers arise in indignation and even the government begins its system of investigation. Finally, as the impersonal scientific attitude pervades and rules, advertising will change its forms and expressions, waste will be eliminated and advertisers of expediency will either disappear or become wielders of power related to human ideals—true educators, but still struggling with people difficult to instruct and stubborn in response to their own good.

It is the advertiser who believes in the far future. It is the advertiser who would unite all things embracing the spirit of truth and fair distribution. It is the advertiser who impersonally projects himself out into the world, insisting that the world get his message. It is he whose message contains a creative germ which will in the future inevitably bring about a fairer relationship of business activity. And the master advertiser is not he who sits in an office doling out information to the public relative to the use of his particular thing for selfish gain. The master advertiser is he who is railway president, university provost, department store executive, individual enthusiast for persistent progress, who recognizes, each in his separate sphere, that the public sentiment at large is his particular institution, the attention and interest of which must be institutionalized in terms of good for all. Business as it evolves must sustain such relations, part for part, as will cause good to react upon the whole. Such are the factors involved in the spirit of advertising progress.

HEALTH AND MORALS

By Edward Martin
Professor of Surgery

It is not inapt that I should speak on health to an audience mostly over-fed; almost without exception clad in accordance with the seasonal custom, regardless of individual need or environment; treating their teeth as adornments rather than as functional and serviceable organs; and under-exercised. In so far as morals are concerned, my talk is less appropriate, since it is addressed to an audience of which probably no single member has felt the strong arm of law defied, nor even the urge to defiance.

A lecture is usually attended by people with no other engagement for that particular hour, and whose views are in consonance with those of the lecturer. Their criticisms concerning the merits of the lecture are tempered by their agreement with its teachings; and the lessons which it carries, if any, are as evanescent as is that sense of dulled mentality which all experience at the end of an hour devoted to pure audition, relieved only by longer or shorter intervals of autohypnosis. Hence I have the cheering feeling that in voicing certain obvious truths I shall do no permanent harm.

Health—what is it? A condition of complete functional efficiency, implying necessarily a joy in life and effort. And morals; these imply an habitual accordance in action, if not in thought, with the customs, regulations and laws, on which depend a fruitful communal life. Hence morals vary with times and peoples.

"Morals" as commonly used being applied mainly to sex relation. Discussions of morals as thus defined before an adult lay audience, are profitable to none, hurtful to some, and often serve as cloaks for the morbidly prurient who in the name of purity or psychoanalysis think, talk and write

unrestrainedly of sexual topics. If such talks are ever serviceable it is when they are given by doctors who dislike the task, and to young people, either individually or in groups. Few are fitted to give such talks; fewer still could be persuaded to do so.

There are two diseases engendered, fostered and transmitted mainly by sexual immorality, which are as crippling and as deadly as either cancer or tuberculosis. Neither is even mentioned in health reports, no restrictions are placed on those who transmit them, usually with full knowledge of the possibility of such transmission; there is no general effort made to check them.

If a child has measles his individual rights and those of his parents are sacrificed to the communal good, and if this seem needful he is taken from his parents and so placed and kept that others are not endangered by his disease. If a man has contracted gonorrhea or syphilis his contagious disease is not even reported; no measures are taken to protect others. If he wishes to go to a hospital he will not be admitted. Even if he intentionally spreads his disease, his victims have no redress. The state shuts its eyes to this foul, spreading and deadly ulcer.

From the scientific standpoint it seems fair to assume that five per cent of the population in America have syphilis, either inherited or acquired; that a larger percentage have or have had gonorrhea.

It is known that syphilis can be made non-contagious in a few hours. There is no communal effort to thus render immediately harmless to others those exhibiting the disease in its transmissible forms.

Gonorrhea can be stamped out by the cooperation of the whole population and at large expense for the sequestration of the contagious. There is no movement in this direction. Our hope in effectively dealing with these curses—not modern curses, for they run back through history—lies in the woman's vote, since it is she who suffers most grievously. The first step lies in the suppression of the liquor traffic, without which

commercialized vice would cease to be financially profitable. Thereafter these contagious diseases should be treated as are treated others far less menacing to the health of the community.

Medical morals call for reticence concerning patients in regard to both their ailments and their personal affairs. Hence the physician is strictly ethical who, knowing a man to be syphilitic, keeps this knowledge to himself, being content with instituting immediate measures to render contagion impossible. If the man refuses to take such measures and is of such character that he will probably disseminate the disease, there is no mechanism by which he legally can be distrained. An initial step in stamping out venereal diseases—and bear clearly in mind that those who suffer from them are not necessarily sexually immoral—lies in making them reportable as scarlet fever and typhoid are reportable. The individual who by misfortune or misconduct becomes a communal menace loses his individual rights for the communal good. Perhaps the woman's vote will bring even this to pass, with institutional provision for sequestration and treatment.

What are the indices of health and how shall each one know if he individually is fit? The first and the most sensitive index of health is gauged by what the monosyllabic youth of the land call "pep," by which they mean the capacity for joyous sustained activity, mental, physical or both. The thinking brain, coming late in the process of evolution, is more sensitive to slight influences than are the older organs immediately essential to physical life; hence the first sign of impaired health—and an invariable sign, if adequate psychic cause be excluded—is loss of "pep." The offensive whistler is silent, the eager student a machine, the intensive talker is mute, the driving merchant a passive obstructionist, the household loses its peace and cheer, the business its push. Here are signs of ill health which, barring acute infections, long precede pain, fever, wasting or cough. Thus one trained nurse wedded to a mere man finds a prompt cure for his occasional lapses from the normal attitude of chastened submission essential

to a happy marriage, in the administration of a laxative, the enforcing of a starvation diet and moderate daily exercise.

Following a loss of power for easily sustained, concentrated effort, fatigue developing early and lasting long, and change in temperament (and for the individual preternatural cheerfulness and optimism may be as ominous as the reverse), come the more obvious but not more significant signs of failing health, as shown by loss of weight and physical strength, pallor or skin pigmentation, impaired digestive power and broken or unrestful sleep.

Granted that you all have health, how shall it be preserved? Our most constant and urgent life-need is air. This which you are breathing now is too hot, is too moist, is too still. Each one of you feels a trifle dull and heavy, a few of you are nearly comatose, due in part doubtless to my soporific talk, but mainly attributable to a lack of skin transpiration, accentuated by the circumstance that this being March, you are dressed for a temperature of 20° to 40°, but sit now and spend practically all your days in one of 70° to 80°. The unchanged air which the several hundred here present will breathe at the end of the hour will contain more oxygen than the air of any mountain resort. Nor will there be present in it an excess of carbonic acid gas. You are drowsy and depressed because the air is hot, still and moist. Move it by electric fans and cool it ten degrees and you would come to life as quickly as you will when you go into the street. And speaking of still, moist, warm air, that decorous, muffled cough I have just heard may mean the sudden projection and wide diffusion of some millions of disease-carrying bacteria which, slowly spreading as does the smoke of a cigar for instance, in this close room without air currents, have a fair prospect of finding one or more victims who provide them with conditions suitable for rapid growth and increased virulence. Grippe, pneumonia, tonsilitis, cerebrospinal meningitis, find their best fields for transmission in hot, moist, still, crowded rooms. Therefore when you are well avoid such rooms, avoid close converse with those who are even mildly infected. In family life isolate

these at the beginning of their infection. Keep your house and business place cool, nay, cold; dress for the temperature in which you mainly live, *i. e.*, thin clothing with temporary thick garments to be worn in the few minutes you are in a wind-blown cold atmosphere, and when you cough, cough into a handkerchief.

As a breeder of disease, a funeral ranks high. The church is usually too hot or too cold, the means of conveyance a closed carriage, with every opportunity given for transmission of disease from one throat to the other, there is a following period of long standing, usually in a strong wind on wet ground, and chill has a distinct effect in predisposing to infection. The chill is simply the favoring factor, not the main one.

Aside from individual peculiarities, the living and working average temperature should be from 65° to 68°. For the aged higher. The feeling of cold should be combated by motion and deep breathing. Hot houses encourage acute infections.

What of food? Among those who are well it is little considered except as a source of pleasurable sensation; those who diet in this class, so doing for the conservation or restoration of a symmetrical figure, rather than for the preservation of health. Nor in those with slight degrees of health impairment is the skilled dietition largely helpful; as suggested by the widely varying menus which a well-to-do invalid may collect from the leading specialists of the various lands through which he travels. The specialist exerts a psychic influence which is important. Still more important, he makes a schedule of food so unalluring and monotonous that the habit of overeating is broken with no conscious effort. The diet is often at fault from the qualitative standpoint. Those who have idiosyncrasies concerning certain foods have learned them by the time they have reached their majority. Seasonal recurrences of departures from health are often dependent upon seasonal food supply; for instance, berries, rhubarb or tomatoes.

The general rule for the diet of those well or nearly so, is to eat those things which they like best, and which they find have agreed with them, in about one-half the usual quantity,

taking twice the usual time to so do. Nor does there seem an urgent need for a general enlightenment on the subject of calories, protein and carbohydrates.

Not essential to the continuance of life, but usually so for the long preservation of health, is exercise; taken daily and regularly and more active than that implied by walking to and from business, reading the newspaper and playing cards. It is essential that this exercise should be taken daily, that for the brain workers it should be carried to the point of stimulation and not to that of exhaustion or even fatigue, and that on its completion the man who takes it should feel fresher, suppler and intellectually keener than when he began. Three to five minutes is long enough, nor does it require any apparatus, or as much time as is spent in shaving. It should be supplemented by deep breathing and can be taken night or morning, preferably both. The army setting-up exercises answer well, but are monotonous, as is everything with no end in view other than health. Exercise with a definite end in view is always more helpful because more entertaining. If this end be the attainment of greater proficiency in any direction and be backed by the determination to acquire such proficiency, the exercise leading to this end becomes in itself of vivid interest. Thus daily practice at quick pointing with shot gun or rifle will make of a poor shot at least a better one and may point the way to a high degree of skill—from fifty to a hundred points, with deep breathing between, are enough for the busy man. Dancing, with occasional correction from an expert, practised alone once daily will make the practitioner less objectionable as a partner. Golf under occasional expert supervision by two years of indoor practice may be carried to a degree of proficiency not attained by most men in a lifetime. Juggling, hand ball, volleying with tennis or squash racquet; some one of these things can be done in any home for five to ten minutes daily, and in any one of them the average man can attain a fair degree of skill.

On Monday the wheels of business creak because of the Sunday over-eating and over-exercise. The test of the proper

degree of exercise is the feeling of well being which follows it and persists. The all-day tennis or golf of the irritable Monday man was too much for him and did him more harm than good.

The physical signs of a hurtful degree of exercise are loss of appetite, troubled sleep and morning tire. The fatigue which is followed by ravenous appetite, drowsiness and sound and refreshing sleep is good for college boys, men on their vacation outings and those who work with their hands; probably also for the brain worker, since it markedly limits his output. The man who makes himself take his five to ten minutes exercise daily for life is better both physically and psychically than he who is too irresolute either to begin or to continue it.

Toward the end of this hour, I see you sitting before me, sagging mentally because of me and the hot moist still air, slouching physically because you have never learned or never heeded the fact that the backbone is meant to act as a column on which are balanced the head and shoulders. If that column is habitually bent forward it ultimately becomes a bow from the concavity of which hang the head, shoulders and internal organs, resulting in contracted chest, displaced viscera, projecting belly and chronic constipation with its attendant deleterious effect on the nervous system. Aside from its bearing on physical health, a correct posture has its psychic and commercial value. Psychic in that it is difficult to acquire and maintain, therefore requires the constant exercise of a self-discipline. Commercial because it is an index of such self-discipline and therefore favorably predisposes all toward him who thus agreeably shows it.

We instinctively and usually rightly conclude that the straight man or woman is cleaner, abler, more dependable and more enduring than the slouch. Here is a picture loaned me by the Posture League. Which would you have in your family or your employ—this limp and drooping boy, or this straight and evenly balanced one? I am showing you a series of pictures from the Posture League and another one which I had permission to use from Dr. Mensendieck, of the Men-

sendieck Institute of New York, whose broad knowledge, wide experience and special aptitude in muscle training have yielded unusual results.

Here followed the exhibition of several dozen pictures showing figures both clad and unclad, illustrating the effect on the viscera of characteristic and habitual vicious attitudes. The unclad picture gave a convincing demonstration of both the sanitary and cosmetic value of correct habits of standing, sitting and walking. The lecturer suggested that exercises should be taken with little clothing on and with a mirror so placed that the postures assumed could be judged and corrected, laying special stress on the sagging bellies of those who habitually slouch, and the ultimate consequences aside from the deformity of the sag.

THE LAW AS SEEN THROUGH A LAWYER'S GLASSES

By Reynolds D. Brown
Professor of Law

When I was invited by the Provost to address you this afternoon I confess that I was considerably in doubt upon what subject to speak to you. I presume that it is customary on these Saturday afternoons for the professors to address their audiences upon those subjects to which they have given so much time and thought that they can speak with a certain force and authority. Now I have the honor to be professor in the School of Law of the University of Pennsylvania, and the particular subject which I teach is property. But with a very great interest in my subject, I could not see my way clear to interest what I may perhaps properly call my lay audience in a discussion of any phase of that broad subject: from the simpler arrangement of estates in land, even though developed with the skill and enthusiasm of a Blackstone, to the more abstract and difficult problems of property, such as the rule against perpetuities, and the rule in Shelley's Case, I ran over in my mind the various possibilities, but came to the conclusion that an address on any one of them might send you home impressed with the perplexities of a lawyer's education, but that at any rate it was certain that you would find it wearisome to a degree, and would resolutely avoid being entrapped into hearing another address on any similar subject. And then the thought occurred to me that while not interested in most of those subjects which go to make up a lawyer's education, yet you are interested in the lawyer himself. Almost every one at times needs the services of a lawyer; even those who do not, in these days at least, know or know about many lawyers; and with a certain shame I must admit that apparently the popular opinion of lawyers has been modified of recent years, so that whereas two or three generations ago the lawyer was looked on by the com-

munity at large as a man of high standing, a leader of the community, today in the minds of many the word "lawyer" suggests sharp practice and efforts to make the worse appear the better cause—faculties which have resulted in popular condemnation from the days of the Sophists at Athens to the present time. It seemed to me, therefore, that it might be worth your while and mine for me to attempt to tear down the veil which separates the lawyer from the great public; to portray to you something of his office, his peculiar problems and relations and his difficulties. I cannot but feel that as with many other problems of life, a great part of the difficulty may disappear, if we can see and state our problem clearly; so perhaps some of the problems which beset a lawyer's relation to the public may be diminished, or perhaps he found to be capable of a complete cure if seen face to face, without any disguise and without any exaggeration. Hence I am asking you to consider this afternoon with me: "The Law as seen through a Lawyer's Glasses."

If you will pardon one additional personal thought, I should like to add why I have felt bold enough myself to approach this subject, and it is this: For over twenty-two years I have practiced in our various courts, thus seeing the rough and tumble side of a lawyer's life. For the same time, I have had the unusual privilege of teaching in the University of Pennsylvania Law School; in that relatively secluded and rarefied atmosphere we deal rather in the problems of the law than in the problems of lawyers, but there one may learn to appreciate some aspects of our problem better perhaps than in daily practice. Finally, for the last two years, I have served as secretary of the Committee of Censors of the Law Association of Philadelphia; that committee, whose very existence most of you probably are not aware of, deals with the charges or complaints that may be made against the conduct of members of our bar. Often before it, the inmost thoughts and motives and the most intimate relations of lawyers are exhibited in the same way that the surgeon's knife discloses to him our inmost organs and exposes to him our real maladies. From these several sources I have

derived some very pronounced views as to the profession of the law, and it is to those that I ask your attention this afternoon.

Before entering upon the more difficult angles of our subject, it may be well in the first place to impress some fundamental ideas. The first is that the lawyer's is a profession, as opposed to the layman's business; the word "profession" does not necessarily imply any superiority—it rather implies an occupation to which some special knowledge is required and for the pursuit of which a considerable period must be devoted to the acquirement of this special knowledge. It implies other things; in the language of the Century Dictionary "the word implies professed attainments in special knowledge, as distinguished from mere skill; a practical dealing with affairs, as distinguished from mere study and investigation; an application of this knowledge to uses for others as a vocation, as distinguished from its pursuit for its own purposes." The public, therefore, has a right to assume that the men who seeks the profession of the law shall have a special knowledge as to the law, and a practical knowledge of the matters with which the profession of the law deals, and (most important of all) that he is applying his special knowledge to use of others. Something has been accomplished, then, in our conception of our problem by our understanding of what the profession of the law means.

In the second place, a lawyer is an officer of the court. In the case of other professions, notably that of medicine, when a student has once obtained his doctor's degree, he becomes a free lance, subject to no other supervision or discipline than any other member of the community; true it is that there are standards of medical etiquette which he should not violate, but if he does violate them, the only consequence is a loss of standing in his profession. In striking contrast with the doctor, the lawyer from beginning to end of his professional career is an officer of the court, and under its direct supervision. In every jurisdiction, an attorney is not qualified to appear in court until he has taken the proper oath. The oath of office in Pennsylvania, as prescribed by the Act of April 14, 1834, is as follows: "You do swear that you will support the Constitution of the

United States, and the Constitution of this Commonwealth, and that you will behave yourself in the position of attorney within this Court, according to the best of your learning and ability with all good fidelity as well to the court as the client, that you will use no falsehood or delay any person's cause for lucre or malice." It is to be noted, therefore, that in being admitted to the bar, in the language of the statute, the attorney is admitted to an "office" within the court. A necessary corollary of this office is the power of the court to punish its officers by suspension, or even disbarment if they misbehave themselves in their office. In Pennsylvania the same Act of 1834, section 73, provides: "If any attorney at law shall misbehave himself in his office of attorney, he shall be liable to suspension or removal from office," etc. We have therefore accomplished a second step in our understanding of the lawyer when we know that he is an officer of the court. Our first inquiry, therefore will be, how the lawyer who has acquired a special learning which he seeks to use for the benefit of others, and who is an officer of the court, has fallen from his former reputation; why it is that whereas a generation or two ago, the lawyer was almost *per se* a leading man in the community, at the present time not only are many lawyers not recognized as leading and useful citizens, but in the minds of many people at least, the profession as a whole has lost its distinction.

It is perhaps instructive to recall that a somewhat similar evolution has occurred with respect to the position of the clergyman. Two or three generations ago, the clergyman, even more than the lawyer, was looked up to as the best educated and often the most cultivated member of the community. Often he was recognized as the real leader of thought in his parish. This position had also in course of time been affected, and at the present time a clergyman, though entitled to and receiving recognition, nevertheless does not in the minds of his congregation usually stand out from the leaders of the community—indeed, often would be ranked far behind them. In the case of the clergyman, this change is probably due not so much to the average clergyman descending in the

scale, as to the average layman ascending. The proportion of laymen who are equally well educated as their clergymen is probably ten times as large today as it was fifty years ago. Something the same may be said with respect to the lawyer; that part of his prominence which was due to the relatively high standard of education in the law as compared with the relative low standing among laymen would naturally be lost as the standard of education among the laymen has increased, and to the extent that the popular opinions of the lawyer are affected by this change, it is of course a change for the better.

But in the case of the lawyer, it must be conceded that in many instances the relation between the lawyer and the layman has been affected not only by the layman ascending, but by the lawyer descending, and it is proposed to consider some of the practical reasons which contribute to this undesirable result.

The first, and one of the most important reasons, is the change in the system of legal education. Until about fifty years ago, the preparation for the study of law in this country consisted of an apprenticeship in a lawyer's office of several years; during this apprenticeship, the law student acquired both a certain knowledge of the practical side of a lawyer's work and also (and more important for our purposes) had a certain close touch with the lawyer in whose office he was registered as a student. Times have changed. Whether because of the modern rush having entered into the lawyer's office as well as the office of the business man or not, certainly the fact is that the offices in which students are really assisted in their work have practically disappeared, and in their place there has grown up the modern law school with its fine law library and its corps of men who are devoting their lives to the task of teaching young men the science of law.

That the modern law school as an educational institution far surpasses the lawyer's office of earlier times cannot be seriously contradicted, but it is equally obvious that in the modern law school there is lacking that intimate relation between preceptor and his students which must have had a very strong

influence upon the character of the student. This does not mean that in the modern law school there are not certain very genuine influences affecting character; but it is probably true that the law student in the modern school misses the application of ethical and professional standards to actual cases which must have been a part of a legal education in a lawyer's office. To have seen a lawyer, particularly a fine lawyer, wrestling with the difficult problems of professional ethics in his own practice must in itself have been an exceedingly valuable aid to his students in their problems as they occurred in later years in their practice, and I cannot but believe that a portion at least of the falling away of standards on the part of members of the bar of the present generation is due to a lack of such precept and example as I have referred to.

A second and perhaps more important cause in the falling away from such standards is the tremendous increase in the number of lawyers. The reasons for this increase are numerous. Of course the profession of the law has always had a fascination especially to men of keen intellect. The high reputation of the successful lawyer is still a large inducement to many a young man to engage in the study of the law rather than to turn aside to the more lucrative fields of business enterprise. Further, the numerous large and well ordered law schools in our big universities make it much easier to acquire a first class legal education, and it almost goes without saying that the young men who has had a first-class preparation has taken a long though not a final step in the direction of success at the bar. The result of these influences, to which may be added the increasing number of statutes which surround the business man and compel him to rely on a lawyer's advice in his every day business, is an almost incredible increase in the number of lawyers, at last in the larger cities. In the smaller towns the bar is still a brotherhood, each member of which knows all the others; each is interested in the success of all the others, and all attend court in order to see how their competitors conduct themselves in the trial and argument of cases. In the big cities, on the contrary, the numbers at the bar are now so great that no one

lawyer knows more than a small percentage of the total number of members of the bar; indeed, the practicing lawyer frequently meets an antagonist in a case whose name he has not even known before. Among the large numbers who come to the bar in large cities, of course there are some of lower standards both of education and character than probably were likely to come to the bar in the middle of the last century. It is not surprising therefore that among the thousands of lawyers at the bar in our largest cities a certain proportion will fail to maintain the standards of their predecessors. Further, it is obvious that such portion in these days of modern newspapers receives an immense amount of newspaper advertisement, so that the newspaper reader gets his impressions of the bar as a whole rather from the not infrequent accounts of a lawyer's misdeeds that he may read in the public press than from his own perhaps very limited acquaintance with the members of the bar in his own city.

Still another element closely related to the foregoing, and indeed directly growing out of the large increase in the number of lawyers, is the undoubted falling off in professional income among the bar as a whole. It is not, of course, denied that among the relatively few very successful members of the bar, professional income is adequate, although even among the leaders, with rare exceptions, it is believed that the standard of compensation is distinctly lower than it would be among the leading business men of an equal degree of mental ability, as for example bankers and manufacturers. But it is believed, contrary to the general impression on the subject, that the average income of the successful lawyer is small—so much smaller than that of the business man who would compare with him in education and mentality as to be really deplorable. No lawyer of experience is unable to point out a considerable number of other lawyers whom he knows who are men of high character, studious habits and real legal ability, and yet may hardly make a living wage from the practice of the law; I refer not to the considerable number who find that they are really for some reason disqualified for the practice of law and who therefore retire from it within a few years after admission to the bar,

but to the large class who continue the practice of law as their life work. Now the lawyer, like the business man, is only human; if his income is not adequate to meet even a reasonable standard of living, he is of course subjected, as the business man is, under similar circumstances, to the temptation to resort to questionable methods in order to increase that income—with the important difference that the lawyer's education and relations to the world are such as to give him a peculiar opportunity on account of his confidential relations with his clients to gain advantages over them in a way which would not perhaps be possible with the ordinary business man. Pecuniary pressure, therefore, itself growing out of the excessive number of lawyers in the larger cities may be credited with being one of the main vital reasons for the falling away of certain members of the bar from the high standards of the profession.

Confirmation of the writer's views in this matter has been received since these remarks were prepared. The vice-president of an important trust company in Philadelphia in a recent conversation with the writer stated that he had a short time ago advertised for a lawyer to fill the position of trust officer in his institution. He said, "you would be surprised to know some of the men who applied and what statements they made with reference to their meager income. They even went so far as to give me figures such as gross receipts $2,500 against expenses of $1,000 or $1,500, and there were many such." This man, who is a business man, with a business man's ideas, was astounded that even lawyers who were known and recognized in the community were in receipt of such inadequate net incomes.

Not only, as just pointed out, is the number of lawyers, at least in the larger cities, increasing at too rapid a rate, but further, the classes of cases which a lawyer is employed to care for has been considerably curtailed. A few familiar illustrations will be sufficient. A generation ago, all conveyancing was handled by members of the bar; since the institution of title and trust companies in our large cities this branch of the lawyer's work has almost entirely disappeared and now practically all

conveyancing is done by the title and trust companies. The same companies have made a further serious inroad into an important branch of the lawyer's work in the matter of serving as executor, trustee or other fiduciary; a generation ago a client almost as a matter of course appointed his trusted adviser as executor of his will, and as trustee of his estate. Fortunately for the bar, this practice has not entirely disappeared, but the permanency of trust companies and their financial responsibility have induced a very large number of testators to prefer the trust companies to their counsel. Without questioning the wisdom of appointing such corporations as executors or trustees, it is sufficient to point out for present purposes that the loss of such appointments by their friends and clients constitute very substantial reasons for the relative falling off of lawyer's incomes, and, as has been pointed out above, the falling off of income almost necessarily increases the possibility of a falling away in professional standards. A very recent additional illustration is quite in the public mind at the moment. One of the acts passed by the last legislature of the state of Pennsylvania (following the example of other important states) was the so-called Workmen's Compensation Law. The underlying object of this law was to render the employer liable to his employee for a fixed sum in proportion to the injury in the event of the employee's being injured or killed during the course of his employment; the economic proposition is that after all the money which the employer pays under such circumstances is really paid by the community in as much as the employer simply insures against such loss and treats the cost of the insurance as a part of the cost of production and charges the consumer therefor—all of which is probably true, but from the point of view of the practising attorney the result has been that at one fell blow a very considerable portion of all the accident cases have been taken away altogether from the courts. The public may have benefited—I am very much inclined to think they have—but the practicing lawyers have substantially suffered as a result of such legislation. Indeed, it is now proposed to extend the principle a step further and apply it to all acci-

dents, *i. e.*, to remove the present limitation of the law to accidents to employees and to invoke the same principle wherever one person is injured by another—at least where that other is a common carrier or has other public duties. At a guess, perhaps half of the time of our courts is devoted to the trial of suits brought against railroad companies, street railway companies, telephone and electric light companies and other quasi-public or public corporations; if, as is not unlikely, a law is passed compelling all such corporations to pay damages upon the happening of an accident without resorting to litigation, it is a fair prediction that the courts of our great cities will be obliged to close down for a considerable fraction of their time on account of lack of business, and that a very lucrative portion of the business of a considerable fraction of the bar will disappear over night.

But possibly enough will have been said to explain the undoubted fact that the lawyer has fallen away in popular estimation; our investigation has shown, I think, that there are adequate reasons for the fact. Before turning from the past to the future, from the statement of the evil to suggestions as of its redress, it is proper to call attention to some of the compensations which to a right-minded lawyer go a long way towards making up for the modest return in dollars and cents. The first and by no means the least important, is the very frequent opportunity for service to people of modest means who have legal difficulties or problems but have not money to pay a lawyer to assist them. As I have not hesitated to admit that many lawyers fall below the proper standards of professional duties, I am perhaps justified in adding with pride that I believe the bar as a whole contribute without compensation to the assistance of poor clients to an extent that would surprise the community if it were generally known. I venture to say that hardly a single lawyer of experience can be found who has not often contributed his services, and in many instances his means as well, to the assistance of a worthy and needy client. And I am sure that those who have will confirm my statement that the thanks of such clients often are a more satisfactory reward

than the liberal fees of clients who are better able to compensate their advisers.

In the second place, a lawyer gets from his every day work a certain satisfaction which (if a professional man may properly speak of a matter as to which he has not had personal experience) it may fairly be believed that a business man does not derive from his every-day business. In saying this, I would not be understood as meaning that in the eyes of the professional man the business man's only satisfaction in his business is the dollars and cents which it produces; I have no doubt that to the successful business man the reputation which he derives and the position which he obtains in the community are quite comparable to financial results. What I call attention to, however, is that in the case of the lawyer, in addition to the reputation and position in the community, which are of course prized by him as they are by the business man, there is a further and special satisfaction growing out of the work itself. In the case of the business man, the daily routine, whether it relates to buying bonds or selling insurance or manufacturing woolens, is hardly an end in itself; indeed the entirely frank business man often does not hesitate to refer to it as drudgery and to express the hope that he may as time goes on be freed from its discomforts. There is hardly anything corresponding to such drudgery in the life of the ordinarily busy lawyer. In the first place almost every case is in some respects at least different from every other case, and has an interest and often has problems that are peculiarly its own; the ordinary client may not know it, but it is a fact that under our systems of judicial legislation practically every important case involves either the ascertainment of a new principle, or the application of an old principle to new and troublesome facts; in other words though a client would often be surprised to know it, a new case often makes new law, and there is to the lawyer's mind a distinct interest in taking part in the process of making that new rule of law, accentuated of course by the fact that he may substantially aid his client's cause if he can convince the court what the new principle applicable to the case at bar should be. But what I venture to

think is the stronger reason why the lawyer's every-day work had a separate and special interest to him is the fact that there is in it an altruistic element; the lawyer is always fighting someone else's battles—not his own, and the fact that he has behind him or beside him a client whose rights whether of person or of property depend upon his skill in presenting his cause is an unending stimulus to the lawyer to exert his best efforts on his client's behalf.

In passing I desire to remove one or two popular misapprehensions as to a lawyer's relation to his client. The first is the very common and very old one that a lawyer, even a good lawyer, is willing to take any case and fight for it, whether good or bad. I have not the slighest hesitation in stating that I believe this to be a very untrue and unjust opinion with respect to most lawyers. There may be a few unprincipled attorneys who act upon such a conception of their profession, but the great mass of attorneys unquestionably do not. When they are consulted about a matter, it is usually before the stage at which a suit has been brought; there has perhaps been a difference between the client and a business acquaintance and the client calls to see his counsel, possibly with a very strong opinion as to his own future course. At just this stage the invariable point of view of the reputable lawyer is to cross-examine his client in order to ascertain the weak spots in his client's case, those which in his natural enthusiasm for his own cause the client will often overlook or minimize. If he finds such weak spots to an extent that justifies a belief that his client's case will fail in court, he has not the slightest hesitation in advising the abandonment of the claim or the recognition of the opponent's rights as the case may be. The lawyer knows very well that to assist his client in a case which the lawyer believes will certainly fail must in the long run not only result in the disappointment of his client, but often from the lawyer's point of view is likely to result in dissatisfaction on the part of the client with the lawyer, and even from the most selfish point of view there are very few cases where the fees received would compensate for an unhappy and dissatisfied client at the

end of the litigation. But in the second place, contrary to the usual lay opinion, there are comparatively few cases in which after full conference with one's client the respective rights of the parties are legally clear. Even if as in the personal injury case, the responsibility of your client to the injured party may be clear, the amount of the compensation will almost always be a matter of difference, as to which lawyers and judges as well may often reasonably differ. But in the great mass even of this class of cases the facts are disputed; when your client tells his story it is perfectly obvious that there will be a conflict of testimony between him and his opponent, and therefore that the case will ultimately hinge on which version of the facts the court or jury will accept. Finally there is the large number of cases in which it is obvious from the outset that legal questions of difficulty may arise; the fact that a large percentage of the cases that are appealed from the lower courts to the appellate courts is reversed shows that even after hearing the arguments of counsel on both sides the trained judge is extremely likely to err in his legal conclusion. The result therefore is that instead of the practicing lawyer representing a large fraction of cases which he knows have no merit, practically he tries no such cases; as to a small fraction he avoids a trial by advising payments or settlements which he retained, but as to the great mass of cases there is not any clear legal answer to the difficulty and he is therefore free to use his efforts on his client's behalf knowing that questions of either fact or law are in dispute as to which his client is entitled to his own best effort. Along the same lines also I would further add that the right-minded lawyer, at least in those cases which occasionally occur in which the strict law of a case will not produce justice, is always disposed to advise his client to take the course which justice dictates, even though in so doing he abandons some technical advantage which the law might give him; with many clients a lawyer acts in this way consciously or unconsciously to the client as a moral as well as legal adviser.

Another popular misconception which I take pleasure in challenging is involved in the expression, so commonly used

with a sneer of contempt, namely the corporation lawyer. Now it must be conceded that there are lawyers whose minds and souls are so bound up with the interest of corporations which they represent that they are not wise advisers, and in particular such lawyers having an impersonal client have doubtless advised courses which have been acted upon by their clients in a way that has produced harsdhip and oppression to innocent persons, as for instance where the just claims of innocent and worthy plaintiffs have been postponed and baffled for years by the perverted ingenuity of legal pleadings and appeals. Conceding this, my criticism of the expression "corporation lawyer" is the assumption that the title brings to the ordinary lay mind, namely that every lawyer who represents corporations or at least large corporations necessarily belongs to this undesirable class. Exactly the contrary is true. In fact when one reflects that a very large percentage of the business of the country is carried on by large corporations and that these corporations must and do have the best legal advice, it becomes obvious that so far from being discreditable to represent large corporations it is and ought to be an earmark of a high-toned and high-minded as well as a successful lawyer. Indeed, it may safely be asserted that the generally recognized improvement in the relation of large corporations to the country as a whole is in large measure due to the wise advice of the attorneys for the corporations whose judgment even in matters not practically or exclusively legal is apt to have controlling weight with corporate officials. Indeed, it may be said that the future relations between big concerns and the law imperatively require that big business shall have the benefit of the best legal talent obtainable in order that the complicated questions growing out of the extraordinary development of modern business may be answered in a way which will be consistent with the public good.

I pass now to a third and perhaps a most important source of compensation to the practicing attorney. This grows practically out of an element previously mentioned, to wit, the fact that the law is growing and ever changing, and that the attorney is taking an important part in this growth and develop-

ment. Of course many attorneys are elected or appointed to represent their fellow citizens in the legislature where the process of making laws is more practically exemplified. But apart from such instances the ordinary lawyer in his every-day occupation is contributing very practically towards the same evolutionary process. He burns his midnight oil not only to win his client's case, but to establish some principle of law and justice that may affect the world for generations to come. Another aspect of this constant change in the law is the corresponding obligation on behalf of the lawyer to keep posted with respect to the change. He can never like the business man leave his subordinates to do the work. He must be on the job the greater part of the time, not only to work on his client's cases, but (perhaps even more important) to use his spare hours for the purpose of studying and observing the great currents of development of the law.

I would push this thought even beyond the domain of the law proper into the wider domain of universal law. I may perhaps properly claim that the thoughtful and experienced lawyer is usually credited with having a wider and fairer view of certain aspects of life than the business man. I think there is a reason for this. In the first place, the lawyer is taught by his daily occupation to look on both sides of a controverted question; he frequently learns that the view which he confidently believed was right will not be sustained either by a court or a jury, as the case may be. This training naturally inspires him with a feeling of respect for an opposing opinion, which, in turn affects his own judgments, and perhaps makes them freer from bias and self-interest than those of the business man who has not had a training along these lines. A secondary result along the same lines is the distinction which the lawyer recognizes between those laws which are fundamentally right and sound, and those laws which exist and must be obeyed, but yet which are believed to be erroneous. The lawyer, seeing the changes in the law constantly going on, ceases to have the blind admiration for many of its rules; he obeys them because they represent the law at the moment, but would change them if they have proved to be unwise and erroneous. He looks behind

the letter of the law, to find its real spirit and intent. On the one hand, therefore, in the lesser affairs of life, he repudiates the maxim "A rule is a rule," and declines to take advantage of an adversary because of a technical violation of the law, where the spirit is not broken; on the other hand, in the domain of ethics, he recognizes as obligatory, the things that are essentially right and just, and urges compliance with them, whether they be embodied in formal municipal regulations or not. As illustrating the point that the lawyer's training teaches him to look for good in even a cause which he himself disapproves, attention may be called to the difference in point of view with reference to great issues like those growing out of the European War. Naturally the citizens of the belligerent countries are, as a whole, convinced that their respective countries are in the right, and are willing to fight in that faith to the bitter end. The curious fact is that in a neutral country like our own, where the interests of the average citizen are only very incidentally touched by the great war, yet the dividing line between those who favor the allies, and those who favor the Teutonic nations is even more strongly marked than in the belligerent countries themselves. The average American, who is on the side of the allies, for example, is apparently more bitterly opposed to the Teutonic nations than is the citizen of France or England who may have lost family and fortune in the contest. It is suggested that on this point the influence and example of the experienced lawyer may be particularly felt; assuming that a particular lawyer be on the side of the allies, he may, nevertheless, be willing to concede that despite the wrongs of the Teutonic confederates, yet there may be much good in these nations, and even some justification for their wrongful acts. He may therefore be able to guide neutral sentiment in the direction of urging an honorable peace upon terms which may insure the nations of the world against a similar calamity, rather than in a blind spirit of temper and revenge, urge the pressing of the war to a complete crushing of the enemy. I repeat, therefore, that in indirect compensations whether growing out of satisfaction rendered, or in the still more remote result of

character building, the lawyer's profession holds out most attractive inducements to those who regard such rewards as better than financial success or business prominence.

Having portrayed some of the temptations which beset the lawyer of the present day, it is proper to suggest briefly some of the steps which may be taken, or are being taken to redress the difficulty. Of course, in most similar matters, the law of supply and demand applies; in any ordinary occupation, if at a particular time there are more men engaged in a special line of business than a community will support, the community will not support them, and the number of applicants will fall off, so that in time the proper relation will be re-established. Because, however, of its appeal to many young minds, this business principle does not seem to apply to the profession of the law; many young men are willing to risk the chance of a small income because of the strong appeal which the law makes. It becomes necessary, therefore, for those who are directing the studies of the young lawyer, to throw some safeguards around him, in order to make him stronger to withstand the temptations to which he may be subjected. Some such safeguards have recently been adopted. In the leading law schools of the country, including that of the University of Pennsylvania, before a student will be admitted to the school, a college degree is now required. While perhaps the primary object of this was to insure a mind developed by a collegiate education to a point where it can profitably undertake the study of the law, nevertheless, a very important aspect of the rule is the fact that it will debar from the law schools a considerable portion of the younger men who have heretofore entered upon the practice of the law both at an age when they were hardly able to withstand its temptations, and also without means which would, to some extent, at least, relieve them from the pressure of such temptations. It is believed that the great majority of the younger lawyers who have failed in their professional standards, are men who have entered the bar at too youthful an age, and without sufficient backing; conversely it is believed that the rule which admits to the law schools only college graduates, will

result in a large proportion of the undesirable younger lawyers being excluded. It is true of course that at the present time a young man may gain admission to the bar by studying in an office, and without any college or law school education, but as times goes on, it may be expected that the good sense of the community will insist upon both, as in the general interest, and when that time comes, it may be confidently predicted that a considerable portion of the undesirable number of at least the younger lawyers will be done away with. Again, the various law schools are only just beginning to recognize the propriety or indeed the necessity of giving their students instructions in matters of professional ethics. Miscellaneous lectures on the subject have been given in different law schools for a good many years, notably at the Albany Law School where an endowment has been furnished for the purpose. University of Pennsylvania Law School is, however, I believe, the first law school in the country to institute systematic instruction to its students in matters of professional obligations. It can hardly be doubted that students who are trained in this subject, even though of course they are not insured against the pitfalls of the profession, nevertheless in addition to their own natural instincts, which are their best protection, have the valuable assistance of knowing how far in similar matters the courts have taken cognizance of professional misconduct; it is believed that a large proportion of the young lawyers who succumb to temptation do so in part at least through ignorance, and it is hoped that instructions in professional ethics will much diminish the number.

The foregoing suggests, however, that the matter is one in which the laymen of the community as well as the bar and the law schools have a real interest and can also be of real assistance. There is a widespread popular notion that a young man who is shrewd and bright ought to be encouraged to study law; many of you will have heard the parents or friends of a young men say that because of his natural brightness he ought to study law. Now if this paper points anything it is the truth that character and judgment are far more important in the

equipment of a young lawyer than natural readiness to learn or some supposed skill in the use of language. The latter is of course desirable; no one can deny the good fortune of the lawyer whose oratory delights equally the court and the jury, but many a case is won or lost outside of courts, and even in court the lawyer who knows his case and has thoroughly prepared it often defeats his more showy but less adequately prepared antagonist. Again, in the law as in other professions and business, a natural aptitude for learning is of course desirable, but like too great fluency it may prove a snare and a delusion unless it is accomplished by and built upon solid character and sound judgment. Indeed, the lawyers who cast the most discredit upon the profession are not the ignorant lawyers who err through lack of education and proper surroundings, but their more fortunate fellows who are favored with fine natural endowment, a facility in grappling with legal problems and perhaps a high degree of skill in elucidating cases to courts or juries, yet lack the fundamental requirements of character and judgment so that they indulge in unwise and questionable litigation and business ventures to the ultimate financial loss and grievous disappointment of their clients. If you should have any young friends who are considering the study of the law, remember that the stable factors of character and good judgment are the first requirements; the others are valuable, but do not in themselves at all take the place of these.

Indeed, the same thought may be properly extended further. Too many people in this busy world employ a lawyer on the same principle on which they deal at a provision store or do business at a bank; namely that a lawyer is known by them or by their acquaintances, and that it seems convenient and easy to avail themselves of his services. I do not believe that this easy going principle is sound in the case of the provision store or the bank; it is actually worth some real trouble to deal with the right kind of store and to deal with the right kind of bank. If you do not go to the trouble to find the right store you will probably have innumerable petty annoyances and troubles growing out of your trading with the second-rate

store, and if you deal with a second-rate bank you may find to your sorrow some day that it has ceased to honor your checks. However this may be with the store and bank, there is not a question whatever but what in the case of a lawyer it pays in every sense of the term to have a first-rate lawyer. The client in the lawyer's hands is almost as helpless as a client in the dentist's chair; with perhaps the difference that with his tooth troubles he is entirely ignorant as to the cause and as to the method of cure, whereas with his legal matters he often deceives himself into thinking that he knows more about them than he really does. Of course he knows or ought to know something of the facts of his case, but what he usually does not know is the facts of his opponent's case (which he often overlooks or underestimates) and the difficulties and perplexities of litigation. What the ordinary client needs when he consults a lawyer is ordinarily, not the clever advocate, because in 3 cases out of 4 his case will never get to court, nor the shrewd and ingenious student of the law, but primarily what he needs is the lawyer of high character and sound judgment and experience who can advise him what is the best course for him to adopt. Take for example the common case of a client who has received a personal injury. He can usually have little or no opinion of value as to the responsibility of the person who caused the injury, and of course his judgment as to the verdict that he may obtain if successful is obviously of no value whatever. It is probably a safe statement that half of such cases are settled out of court, and in every one of such cases a client may have received substantially less than he would have received had he been more skillfully represented, and yet he of course has no knowledge himself of what he has lost. He has lost simply because he has consulted a lawyer who has not either the requisite skill or the requisite experience to advise him wisely as to his position. It would seem indeed to be a general principle applicable to doctors, dentists, lawyers and professional men generally, that if you have a case which is necessary to take to them at all, the best man you can get for the job is the cheapest—only remembering that in the case of a lawyer (much

more than in either the case of the doctor or the dentist) the character element is the first and most important consideration.

If it would not unduly extend these remarks, it would be easy to pursue the same thought into the field of the judiciary. The writer is one of those who believes that the system of judicial election by the people is unwise; that in the very nature of things the people are not qualified to decide who should serve on the bench, and that decision should be made by the highest executive authority, to wit, the governor of the state. This principle is in force in the federal courts and on the whole with distinctly desirable results. So long, however, as people have a vote in the choice of judges, it is much to be desired that they really interest themselves in the subject; that they should not look upon the election of a judge as a matter which does not concern them. As a matter of fact, it is questionable whether any other office as vitally touches the community as the office of judge, who by his decision may affect the life, liberty or property of any or all of the citizens of the community. In the nature of things, the layman cannot have an expert opinion as to the legal qualifications of the candidate for judge, but he can and should see to it that no man is elected judge who has not a sturdy character and the requisite experience. It is certain that if the laymen of the community would interest themselves actively in the selection of judges to the extent above indicated, there would be less complaint of having judges named by politicians placed upon the bench without any public interest and often to the detriment of the public.

The writer closes these remarks with the expression of the hope that this little look into the inside of a lawyer's life may be of some practical value to the audience.

INFLUENCE OF THE STUDY OF ANIMAL DISEASES UPON THE PUBLIC WELFARE

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The average city dweller is very likely to look upon disease in animals as something which concerns only the animals themselves and their owners. Although this is, perhaps, a very natural conclusion under the circumstances, it is, at the same time, a very superficial view of the matter.

In the first place, every individual in a nation is affected by the condition of its agriculture. Good crops bring general prosperity. Good crops depend upon soil fertility. In order to keep up the fertility each farm must maintain its quota of livestock, and if this is to be done profitably, and it can be done in no other way, the animals must be protected from disease. Secondly, disease among meat and milk-producing animals causes losses which in the end must be borne by the consumers of their products. Beef cattle, hogs and sheep cannot be sold to the butcher for less than it costs to produce them and losses from disease must be counted in with other expenses. The butcher must sell the meat and other products at a profit and if an animal is condemned as unsuitable for food on account of disease the cost of that animal must be charged up with the other expenses. And finally, in another and perhaps more important respect, animal diseases, or some of them at least, may touch the life of almost any individual. A number of these diseases are transmissible to mankind, some of them being of a very virulent and fatal character, and consequently any work which leads to their control or suppression is of assistance in protecting the health of mankind. This brief and general survey of the subject is probably sufficient to show that the study of the diseases of our domestic animals is not only of service to owners of live-stock but extends its influence into every class of

society. If we consider briefly some of the work which has been accomplished, this fact will be brought out more clearly.

Perhaps no investigation has yielded results of greater value than the study of the disease of cattle known as Texas fever. This malady, because of the peculiar manner in which the infection is transmitted, had for years been a mystery and a cause of great anxiety to cattle owners in certain parts of the country. Cattle shipped by rail or driven overland from the southern portion of the United States to the more northerly sections never failed to leave a trail of diseased and dying animals in their wake, except in the colder seasons of the year. Close proximity or actual contact was not necessary. Cattle which had not been near the southern cattle but which had merely crossed their trail or used the same pastures, in some instances weeks after the passage of the southern cattle, took the disease and died. Cattle from the northern districts became infected when placed in stockyard pens or shipped in railroad cars which had been occupied by cattle from the south. Farmers could not go to public stockyards to buy stock cattle or thin cattle to fatten without frequently having them sicken and die after they got them home. To add to the mystery, the cattle which spread the disease were apparently healthy, while those which were actually sick did not give the disease to others. When these facts were related to persons who had not observed the conditions they were received with incredulity and were jeeringly spoken of as "a romance in pathology." The conditions were so radically different from those associated with other diseases that it is not surprising that the reports concerning the diseases were questioned. While the cattle owners in the east suffered losses from the disease as well as those in the west, it was in the southwest where the greatest damage occurred. The great herds driven up from lower Texas and the Indian Territory to the railroad shipping points in southern Kansas caused enormous losses among cattle coming over the same trails from the Panhandle of Texas, the upper part of Oklahoma and southern Kansas. Herd owners in northern Oklahoma and lower Kansas had such a dread of the southern cattle that they sometimes

placed their cowboys on guard with guns to prevent the southern cattle from being driven over their grazing lands. The men from the South, believing the animals in their charge to be entirely healthy, were usually incensed at this violation of the courtesies of the range, and many a sanguinary battle occurred between the two parties concerned.

There were, of course, all sorts of theories regarding the cause of the disease and the method of its transmission, some based on observation and some purely imaginary. Among the lot was one which upon investigation proved to be not only correct but also of great importance. The cattlemen, usually close observers, had noticed that the cattle which spread the disease always had a large number of insects, called ticks, attached to their skin. An investigation by the late Dr. D. E. Salmon, then chief of the United States Bureau of Animal Industry, discovered the fact that the district from which the disease-spreading cattle came was infested with these ticks. This district was located south of a line beginning on the Atlantic coast at the lower border of Maryland and extending across the country in a southwesterly direction to the Mexican border near El Paso, and thence along the international boundary line to the Pacific Ocean. It was the usual thing for the cattle in this district to have large numbers of ticks attached to their skin. But it did not appear reasonable that the bite of a small insect could produce such a severe disease as Texas fever and so the investigation was continued. Finally, in 1889, Dr. Theobald Smith, working in the laboratory of veterinary pathology at Washington, discovered that the cattle in the tick-infested district carry a small parasite (*pyrosoma bigeminum*) in the red cells of their blood, although they are apparently healthy, and that this same parasite is present in the blood of the tick. From subsequent studies (Smith, Cooper Curtice and Kilbourne), it was learned that the parasite is transmitted by the adult female tick to the larvæ hatched from its eggs and that these larvæ, when they become attached to the skin of the cow, inject the parasite into the blood of the animal. The cattle in the tick-infested district being inoculated in this manner when calves, an age when they are

naturally immune, acquire a tolerance for the parasite and do not become diseased, but when the larvæ ticks become attached to the skin of cattle which were not raised in the tick district, and which are therefore not immune, the injection of the parasite into their blood produces the disease known as Texas fever. Studies of the life history of the tick disclosed the fact that the females remain attached to the skin of the cow until they reach maturity, when they drop to the ground and, crawling under some protecting material, deposit a large number of eggs. The young ticks hatched from these eggs crawl up the nearest blade of grass and when opportunity affords transfer themselves to the skin of an animal of the bovine species, move about until they reach one of the places where the skin is thin and soft, pierce the skin to reach the blood, and then develop into adults which repeat the life cycle. These discoveries explained why animals which were apparently healthy spread the disease; and how it was possible for animals to contract the disease without coming in contact with those which were spreading the infection and by merely passing over the same ground. The failure of the sick animals to transmit the disease to others was due to the circumstance that they were located in a climate in which the warm season did not continue long enough to permit a second generation of ticks to develop. The larvæ ticks on the sick animals did not attract attention before the investigation because of their very small size, while the adult ticks on the southern cattle were observed because they were much larger (about the size of a bean).

These discoveries have proven of extraordinary value. They made it possible to arrange a system whereby cattle can be shipped from the tick-infested district to northern points for immediate slaughter without infecting other cattle. This system has been in operation for over twenty years and has proven entirely satisfactory. It has not only prevented the enormous losses which formerly attended the movement of southern cattle northward, but it has also facilitated the marketing of about a million beef cattle a year from the tick-infested district and has thus contributed indirectly to the meat supply of the country.

This is a matter of no little importance in a country in which the population is increasing much faster than the supply of meat-producing animals. The tick-infested district possesses many natural advantages for raising cattle economically, but the native cattle were of an inferior type and animals of a better type could not be introduced from the north to breed up the herds because they almost invariably were infected with Texas fever and died. With the information obtained as to the nature of the disease a method of inoculation was worked out which made it possible to introduce young cattle from the tick-free regions with only occasional losses. From the knowledge gained of the life history of the tick and the discovery of substances which would kill ticks on cattle without injury to the animals, several methods were developed by which ticks can be eradicated from the infected district. These methods have been in operation since 1906 and during that time 253,163 square miles of territory have been cleared of ticks, an area greater than the combined areas of Alabama, Florida, Georgia, Mississippi and South Carolina and constituting more than one-third of the originally infested area. The eradication of the tick from this extensive territory has not only removed the restrictions under which fat cattle were shipped to northern markets, but it has also made it possible to ship out thin cattle to be fattened in northern feed lots. This latter privilege is of great importance because while the grasses and the protein feeds which give growth are cheap and plentiful in the south the carbonaceous feeds like corn, which are necessary to put the animal in prime condition for slaughter, are more abundant in the north. Furthermore, with the tick gone, fully developed pure-bred sires can be introduced to grade up the native cattle without danger of death from Texas fever. These conditions all have a tendency to encourage the breeding of cattle in a section which has many natural advantages for this particular line of agricultural activity, which is of very considerable economic value in a country in which the population is outgrowing its meat supply.

But of greater importance than any of the results which have been mentioned is the effect which these investigations had upon

the study of other diseases. The discovery of the fact that the blood parasite which is the cause of Texas fever was transmitted from one animal to another by the tick marked a new epoch in medicine, just as did the discovery of vaccination by Jenner and of antisepsis by Lister. It was the first demonstration of a method of transmitting disease which was entirely different from any other which had been previously observed and it gave a new impetus to the study of some of the diseases of man of which the cause and manner of transmission were then unknown. It was the basis of the investigations which led to the discovery that yellow fever is transmitted by the bite of a certain species of mosquito (*Stegomyia fasciata*) and which revealed the fact that another species of mosquito (the *Anopheles*) transmits the parasite of malarial fever from one human being to another. These discoveries in turn suggested other investigations from which it was learned that bubonic plague is transmitted by fleas, typhus fever by lice, and Rocky Mountain fever, African relapsing fever, Miana fever and Japanese flood fever by ticks and mites. Up to this time, as a direct result of the study of a single disease of cattle, we have the discovery of the method of transmission of eight diseases of man. The knowledge with regard to yellow fever proved especially valuable because it has made it possible to prevent the outbreaks of this disease which recurred almost every summer in our southern ports and which existed almost continuously in tropical countries. It has been truly said that the men who discovered the method by which yellow fever and malaria are transmitted were the real builders of the Panama Canal, but this claim can, with at least equal justice, be extended to include the man who discovered the cause of Texas fever and its method of transmission, for he was the pioneer who blazed the trail for the others.

The practical value of knowledge concerning the diseases of our domestic animals as a working basis for plans for the extermination of exotic diseases has been illustrated in this country on several occasions. About the middle of the nineteenth century, contagious pleuro-pneumonia, a highly infectious disease of cattle, invaded this country from Europe, appearing first in

Massachusetts and spreading from there to other parts of the country. Attempts were made to control it, but in spite of these efforts the infection gradually spread westward until, in 1886, it appeared among cattle in the vicinity of Chicago. The appearance of the disease in that section created great anxiety because it was feared that it would eventually reach the cattle on the great ranges of the west, and it was felt that if the infection invaded these large herds that the disease would become permanently established in the United States. Congress, being called upon for relief, passed an act in 1887 appropriating funds and extending the authority of officials to deal with the disease. Using the knowledge obtained from studies of the disease by others in Europe, federal and state officials then united upon a plan of action which resulted in the entire eradication of the disease in less than five years. In 1892, the ports of Europe, which had been closed against cattle from this country on account of the disease, were reopened and our export trade was revived. The disease has not since reappeared in this country, the introduction of infection having been prevented by the quarantine regulations which govern the importation of cattle from infected countries, although in the meantime it has prevailed from time to time in various parts of Europe, Asia and Africa, causing great loss and inconvenience.

Foot and mouth disease, another disease of animals which is prevalent in Europe and in other parts of the world, but which has not become established here, has invaded this country three times since the beginning of the present century. In 1902, it appeared in Massachusetts and was carried to Rhode Island, Vermont and New Hampshire, but was stamped out before it could spread further. The disease again appeared in Michigan in 1908 and was carried to New York, Pennsylvania and Maryland by several shipments of cattle before its presence in the United States was known. Its further spread was prevented, however, and it was entirely eradicated within three months. The last outbreak began in October, 1914, and continued throughout 1915. This was far more extensive than either of the previous epidemics. About 170,000 animals died or were

slaughtered to prevent the spread of the disease. The value of these animals was approximately $5,750,000. This outbreak attracted general attention throughout the country because of the number of animals involved and their value, and yet there are a number of animal diseases continually prevalent in the United States which exact a greater toll every year to which the general public gives little or no consideration. The methods by which these three outbreaks of foot and mouth disease were stamped out were based upon information gained by studies of the disease in Europe and without this knowledge and its proper application the losses sustained would have been much greater. The disease would probably have gained a permanent foothold in the United States and thus become a more or less constant cause of loss and inconvenience. Our knowledge concerning the disease, however, is not complete and consequently we are not able to prescribe quarantine regulations which will entirely prevent the introduction of infection. The infection which started the 1908 outbreak was brought to this country from Japan in infected smallpox vaccine, a mode of transmission which was not even suspected previously. How the infection was introduced in 1902 and 1914 could not be definitely determined. The necessary steps have been taken to prevent the reintroduction of foot and mouth disease virus with smallpox vaccine, but the channels of entrance in 1912 and 1914, being unknown, cannot be specifically guarded against.

A striking example of the economic importance of animal diseases is found in the disease of swine known as hog cholera. This infection has been the cause of enormous losses. It has repeatedly swept through the great hog raising sections of the corn belt to the financial ruin of large numbers of farmers, and dread of its devastating effects has caused many farmers to limit their hog-raising operations or to remain out of the business entirely. It has occureed to a greater or less extent each year, but in some years the losses have been much greater than in others. In 1912, in Iowa, Nebraska, Kansas and Missouri alone, it destroyed over 3,000,000 hogs, the estimated value of which was $30,000,000. In 1913, the single state of Iowa lost 2,709,876

hogs which were valued at $27,098,760. According to an estimate of the secretary of the U. S. Department of Agriculture, based on data for thirty years, the direct losses from this disease in the country at large have averaged about $75,000,000 a year, which is about one-eighth of the total value of all the hogs on all the farms in the United States. In addition to this there are indirect losses which cannot be estimated but which amount to a considerable sum. While these enormous losses fall most directly upon and are felt most heavily by the owners of the animals concerned, they also affect others. By decreasing the available supply of pork and by discouraging production for future requirements, they are a very potent factor in increasing the price of meats. Consequently, their influence is felt by every person who purchases this article of food.

Because of the great importance of the hog-raising industry to the country in general, but especially to agriculture in the corn belt, considerable attention was given to the study of this disease. The cause of the malady eluded detection for a long time, but in 1904 it was found to be due to what is known as a filterable virus, *i. e.*, a disease-producing agent which is so small that it will pass through a porcelain filter and is not visible under the most powerful microscope (de Schweinitz and Dorset). This discovery pointed the way to the production of a serum which alone or in combination with the virus will protect hogs against the disease. When the method of preparing this serum and the results to be obtained from its use were made public there was such a demand for it from farmers, especially in the central west, that a large number of persons engaged in its manufacture, many of them with insufficient training and incomplete equipment. The result was that a quantity of serum which was worthless or harmful was placed on the market. To make matters worse, a good deal of the serum was administered by men who were not competent to do the work. In many instances, sanitary measures were neglected; the serum was depended upon to take care of everything. The outcome was what would naturally be expected. More hogs than ever died from cholera. When properly prepared and properly used, however, the serum has

proven of great assistance in saving hogs from death by this disease. Formerly, when cholera broke out in a herd, nearly all the hogs died but now, with the proper use of the serum, all but a very small percentage can be saved. In sixteen countries in various states where federal and state veterinarians took charge of the outbreaks, the death rate from hog cholera was reduced from 178 per 1,000 in 1912 to 49 per 1,000 in 1914. Not only has the vaccination process provided a means of greatly reducing the losses from hog cholera but it has also made the raising of hogs much less hazardous. This has had the effect of encouraging hog-raisers to enlarge their operations and has induced others to engage in the business. Directly and indirectly, it has operated to increase the available meat supply of the country.

There is a disease which frequently affects dairy cows which is commonly known as milk fever (*parturient paresis*). It usually attacks the cow two or three days after the birth of a calf, *i. e.*, just when the animal has emerged from the dry period and has resumed the secretion of milk. Heavy milkers in good condition are the most susceptible. Prior to 1897 there was no very satisfactory treatment known for this disease and about seventy-five per cent of the affected cows died. We have no data to show the extent of the losses sustained, but they must have been enormous. These losses, of course, increased the cost of producing milk and other dairy products and also reduced the supply of beef. In 1897, a veterinarian in Denmark named Schmidt, working on the theory that the agent which causes the disease is generated in the udder, discovered a method of treatment which is remarkable for its certainty and promptness. He found that by the simple expedient of inflating the mammary gland with oxygen or air that the animal could be cured in nearly every case. Usually within an hour or two after treatment the cow, which was paralyzed and unconscious, will be standing up, placidly munching hay. From one of the most fatal diseases of the dairy cow, milk fever has become the one above all others which can be most surely and most promptly cured. Schmidt's discovery, in addition to being of great economic worth, is also an illustration of the practical value of a scientific theory.

Eclampsia, a disease of woman which follows childbirth, is similar in many respects to milk fever of the cow, and in two cases of this disease of which I have knowledge the Schmidt treatment was used with great success. One of the patients was under the care of three physicians who had pronounced her case practically hopeless.

The study of tuberculosis has yielded information which has proven of great value. Although tuberculosis in animals must still be regarded as an incurable disease under practical conditions, a vast amount of knowledge has been obtained which can be used in preventing the spread of the disease to other animals and to human beings. Among the most valuable discoveries in connection with this disease is the tuberculin test, by means of which it is possible to detect an animal affected with tuberculosis before any symptoms appear. Since it is very necessary to separate the diseased from the healthy animals in carrying out any plan to check the spread of the infection, this test has proven of very great service. That control of this disease is a matter of considerable economic importance will be generally conceded when it is realized that it causes an annual loss in the United States of $25,000,000. Another and perhaps a more important aspect of the situation is the fact that tuberculosis may be transmitted to human beings, especially children, by the milk of cows which have the disease in certain organs. An announcement made by Koch at the International Congress on Tuberculosis held in London in 1901 created the impression among the general public that tuberculosis of cattle was not transmissible to man, but at a succeeding congress in Washington in 1908 he stated that he had been misunderstood; that the idea he had intended to convey was that tuberculosis of cattle was the source of tuberculosis in man in such a small percentage of cases that it could be practically ignored. Koch's announcement caused a very full investigation to be made of the subject and the facts developed disproved his contention and showed that in a considerable percentage of cases, especially in children, the infection can be traced to bovine sources. The meat of tuberculous animals must also be considered dangerous when the

disease is located in certain organs or tissues and the flesh of animals so affected should be condemned. A considerable loss results from this cause. During the fiscal year ending June 30, 1915, one in every hundred of the 58,000,000 animals slaughtered under federal inspection were found to be infected with the disease, 587,760 carcasses or parts being condemned. These figures, however, do not represent the extent to which tuberculosis exists among the meat-producing animals in the United States, because only about sixty per cent of the animals slaughtered for food purposes are inspected by federal veterinarians. No figures regarding the condition of the other forty per cent can be obtained because most of them are slaughtered without inspection, but it is quite certain that the percentage affected with tuberculosis is much higher because animals in which the disease is suspected usually find their way to slaughter houses where inspection is not maintained.

Glanders, an infectious disease of the horse, is also transmissible to human beings and usually terminates in death. It is especially dangerous because a horse may be infected without showing any visible symptoms and at the same time the animal may be a source of infection to other horses and to man. The study of glanders resulted in the discovery by the late Dr. Pearson, a former member of the University faculty, of a method of detecting these occult cases which is known as the mallein test. This test has proven very valuable in checking the spread of the disease because it has made it possible, when the infection has appeared in a stable, to discover at once all of the horses which have contracted the disease, and to immediately take such steps as may be necessary to prevent them from becoming new centers of infection, instead of waiting for weeks or months until symptoms appear.

Anthrax is another disease of domestic animals to which human beings are susceptible. Tanners and others working with the hides of diseased animals are most frequently affected. The anthrax spores enter wounds in the skin and produce a condition known as malignant pustule or malignant carbuncle. Unless proper surgical treatment is promptly applied, the germs enter

the blood and then the disease is very likely to prove fatal. Persons working in establishments where wool is sorted sometimes contract anthrax by inhaling spores from the wool of diseased sheep. This form of anthrax is commonly known as wool sorter's disease and usually ends in death. Anthrax may also be contracted by eating flesh which has been obtained from an infected animal and which has not been thoroughly cooked. A rather unusual method of transmission of the disease is reported from England, where a number of men were recently infected with anthrax by using shaving brushes made from the hair of a diseased animal.

Our information regarding anthrax extends back to the earliest times. It is supposed to be the disease mentioned in Exodus as the sixth plague of Egypt by which the cattle of the Egyptians were laid low. Very good descriptions of it are found in the writings of Homer, Ovid, Plutarch and other ancient authors. Our exact knowledge of it begins, however, with the discovery of the bacillus of anthrax in 1863 by Davaine. Previous to that period a number of other diseases were confused with it.

The blood of an animal affected with anthrax fairly swarms with bacilli and they are also contained in large numbers in the bloody discharges which occur during the disease. When the bacilli escape from the body, either before or after death, they form spores. These spores bear the same relation to the bacilli as the seeds do to plants. When the ground is contaminated with the blood or discharges, the soil is very likely to become seeded with these spores. Animals grazing over the ground later will very probably take the spores into the alimentary tract with their food and will thus be infected with the disease. The spores are very resistent and will live in the soil for years. Low, moist ground, seems to furnish the most favorable environment. Instances are known where cattle have been infected with the disease by grazing over an anthrax grave years after the carcass was buried. Pastures also have proven infectious after animals have been kept out of them for several years in the hope that the spores would die out. Herds grazing along streams have been infected by discharge from tanneries in which

hides from diseased animals were treated, and scraps of infected hides from tanneries spread on land as fertilizer have sown the ground with anthrax spores. The infected hides in many instances were shipped long distances, in some cases from China. Hay and straw grown on infected soil may also carry the spores to far away places.

Anthrax is very fatal to animals. This fact, together with the persistence of the infection in the soil, led early in the study of the disease to the conclusion that the best method of controlling it would be to create, if possible, an immunity in the animals in infected districts. This was one of the first problems which engaged the attention of Pasteur, the brilliant French bacteriologist, who, in 1881, developed a method of vaccination by which animals grazing on infected land could be protected against infection. This vaccination method proved of great service. By its use the disease was eradicated from some districts and by annual vaccinations animals were kept on infected pastures with only slight losses. But the vaccine was not entirely satisfactory. It did not keep well and its strength was uncertain. The difference in strength sometimes led to very undesirable results. If the vaccine was too weak the animals did not develop an immunity and they contracted the disease and died; if it was too strong it was likely to produce the disease instead of conferring an immunity. These defects in the Pasteur vaccine stimulated further research which resulted in the development of an immune serum and also of a method of preparing a vaccine from the spores, the strength of which could be more accurately measured. The immune serum is used to protect animals which have been exposed to infection while the serum and vaccine are injected simultaneously when there has been no immediate exposure to the disease. This procedure gives very satisfactory results and is a great improvement over Pasteur's method. The immune serum also has power to cure the disease. It has been used for this purpose in animals with very satisfactory results and it has also been used with success in the treatment of several cases of anthrax in man. We have in this serum, therefore, a remedy for a very serious and frequently fatal con-

dition in man which was discovered as a result of the study of a disease of animals.

There are a number of other achievements to which I might refer, but I cannot expect to occupy your time any longer and what I have already said is, I think, sufficient to warrant the statement which I made in the beginning, namely: that the study of animal disease is not only of service to owners of live-stock but extends its influence into every class of society.

THE FAMILIAR ESSAY

By Percy Van Dyke Shelly
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In one of his more intimate essays, one that is somewhat exceptionally full of details as to his personal habits and tastes, Montaigne informs us that sometimes he prefers claret wine to white wine, and sometimes white wine to claret. The younger Scaliger, with this passage in mind, asks, with some heat, "What the deuce does it matter to us which he prefers?"

Scaliger was a learned man—the most learned man of Europe in his day. Than "learning," Montaigne valued few things less; he expressed a vigorous contempt of pedantry and wrote ingeniously of the advantages of ignorance. To the erudite Scaliger the confidences of the garrulous Seigneur de Montaigne seemed, no doubt, but so many impertinences, or evidence of a monstrous egotism. Possibly the great man's question was prompted by a touch of spleen; it may have been a pedant's fling at one who had denounced pedantry. But it seems more probable that the irritability arose from an offended taste, from a gentleman's sense of the indecorum of a man's talking about himself and assuming that all the world will be delighted to listen. That the world generally *is* delighted to listen—at least when the talk of self is neither boastful nor snobbish—Scaliger seems not to have observed. Nor is this to be wondered at. Those forms of prose literature in which the interest centers about the study of personality, either subjective or objective, and concern themselves largely with the intimate affairs of life—the biography, autobiography, essay, novel, etc. —were just coming, or had not yet come, into existence. Montaigne himself had only just discovered, for himself and the modern world, the literary value of the ego. In his "Essays" he was giving the public a first taste of the delights of the literature in which an interesting personality portrays

itself. By writing of himself, Montaigne had created a new thing—the essay; and Scaliger seems not to have been superior to the majority of critics in being unable to perceive the merits of a new literary mode.

Scaliger is dead. Montaigne still lives, and has been a force in literature from his day to this. Moreover, the influence he has exerted and the vitality of his works have in no small measure been due to that very habit of mind which led to his confiding to the reader his preference in the matter of wines. His being so entirely human and altogether frank explains at once his creation of the literature of gossip and his enduring popularity. He discovered that what interested him as a man, however trifling, would in all probability interest others; and he was the first to use this discovery consistently in the choice and treatment of subjects for literary purposes. He tells us that he crossed himself when he yawned. "Scratching," he writes, "is one of Nature's sweetest gratifications. . . . I use it most in my ears, which are apt to itch." The insignificant things, which after all make up the greater part of life—these, along with many higher matters, Montaigne had the humanity and courage to write about.

In her "Diary and Letters," Madam d'Arblay gives an account of a meeting with Boswell in Windsor at the time his "Life of Dr. Johnson" was going through the press. The great biographer, his pockets full of proof-sheets, was hot on the scent of additional material to illustrate his great subject. He appealed to Madam d'Arblay, declaring that he needed her help. "Yes, madam," said he, "you must give me some of your choice little notes of the doctor's; we have seen him long enough upon stilts; I want to show him in a new light. Grave Sam, and great Sam, and solemn Sam, and learned Sam—all these he has appeared over and over. Now I want to entwine a wreath of the graces across his brow; I want to show him as gay Sam, agreeable Sam, pleasant Sam; so you must help me with some of his beautiful billets to yourself." The anecdote illustrates, as few things could, the deliberateness with which Boswell sought to paint Johnson the man rather than Johnson

the "Great Cham of Literature" or the "Great Moralist" or the "Great Lexicographer." Boswell's "Life of Dr. Johnson" is a book that we call priceless, unique in our literature and in the literature of all time—a thing so good that we cannot imagine its ever losing its interest. The reason is that in it a memorable and unique personality is portrayed to the life, as he lived. We see Johnson among his friends, we hear him talk, know how he dressed, ate, drank. Here, we say, is an authentic bit of the past made real; a personality ever interesting, rescued out of the jaws of time; the man himself, reported in his essential character. Now, Montaigne too was a unique and memorable personality, and it is his chief distinction that he had the courage to be his own Boswell.

There are but few of the forms of literature in which the author appears in undress. If not sock or buskin, he wears a poet's mantle, or dons gown and spectacles, or frock coat and top hat. Usually his relation to the reader is a formal one. In a manner he speaks *ex cathedra*, he feels the restraint of his subject, has an eye to the effect his utterances may have upon the public. He communicates his thought, his feelings, and emotions; but impersonally, or remotely. He is, in a sense, on public view, and not altogether himself. He establishes no intimate relations with the reader. Even the lyric poet, while writing of his inmost passions, is a poet

> "—hidden
> In the light of thought—"

But there are other kinds of literature in which, as Hazlitt puts it, "the reader is admitted behind the curtain, and sits down with the writer in his gown and slippers;" types in which the author puts us upon the footing of fellowship, admits us to the circle of his acquaintances and friends, and does not so much write as talk. Of these kinds, the chief are the autobiography, the familiar letter, and the familiar essay; and the last is that in which the writer is perhaps most at his ease, most truly himself, and closest to the reader.

The term "essay" has come to be applied to many kinds of

composition. We have Locke's "Essay on the Human Understanding," Pope's "Essay on Man" and "Essay on Criticism," Macaulay's biographical, historical, and critical essays, Huxley's scientific essays, Mill's economic essays, Symonds' "Essays Speculative and Suggestive." There are the aphoristic essays of Bacon and the periodical essays of Steele and Addison. But all of these represent an extension in the use of the term and are writings of a different stamp from the original essay, which was essentially familiar. The essay of the type originated by Montaigne we are now obliged to distinguish from all other kinds of essays by some such epithet as "familiar" or "personal." This, in its essence, is a short prose composition in which the author, writing of himself or of something that is near to his heart, discloses his personality to the reader in an intimate and familiar way.

Alexander Smith, one of the less known and most excellent of familiar essayists of the mid-nineteenth century, and the author of "Dreamthorp," is of opinion that "Of human notabilities, men of letters are the most interesting." If such is the case, we see at once one of the secrets of Montaigne's success and of the success of the other familiar writers. They are the men of letters who, in their works, give us most of themselves. Your true essayist talks much of himself. In him that part of man which loves to gossip is not undeveloped. He talks of his hobbies, his friends, his family, the books he reads, the plays he sees, the places he visits, what he likes to eat and drink. He dwells on his loves and hatreds, his aversions and prejudices. And usually in the most engaging way.

Yet there is much more in all this than mere gossip. If your man of letters is the most interesting of human notabilities, it is probably not so much because he is more articulate or outspoken than others, as because more than others he is interested in that which concerns the human mind and heart. The essayist, even in his most gossipy moods, touches some of the most profound things of life, and it is the frequent suggestion of the sublime and the universal that makes true literature of what at first appears to be but idle gossip. "I had one

tooth lately fall out," writes Montaigne, "without drawing and without pain; it was the natural term of its duration." This is not an impertinent commonplace. To this experimental philosopher and moralist the incident is significant, and he concludes, "God is favorable to those whom he makes to die by degrees; 'tis the only benefit of old age; the last death will be so much the less full and painful." In fact, Montaigne was interested in himself not egotistically but philosophically, as a student of wisdom and a seeker after truth. That he wrote about himself was largely incidental, the result of his philosophical method. With a lively sense of the uncertainty of knowledge, he believed that a man might know himself better than any other subject in the universe. He wrote of self because that was the subject he best understood, the subject in which he was "the most understanding man alive," and because of his belief that "each man carries the entire form of the human condition." Thus he studied self in an empirical way, and that he might know life. From incidents and observations of his own life he proceeded to general truth, and employed in the study of moral truth the method that Bacon developed later in philosophy and science. His writings are not only "essays of his judgment," but, as he says, "essays of his life;" and through this they are essays of life in general. The personality of Montaigne becomes interesting to all readers because in it they find themselves. Moreover, though an "undisguised egotist," Montaigne is interested in many things other than himself, in all men and things that contribute to his intellectual life, that feed or satisfy his curiosity, in all that is human and pertains to the values of life. He shows an eager curiosity to know what men do and have done—in times of emergency, despair, health, illness, death; in dangers and difficulties of state. All the busy and heroic world of the past, the Caesars, Alexanders, generals, governors, philosophers and poets, their acts and their thoughts, interest him. He weighs their actions and motives, and asks whether they did well. Above all, from one end of his book to the other, Montaigne is interested in the soul.

Thus the essay in Montaigne's hands is essentially a medium through which the author presents his philosophy of life. And following him, the true familiar or personal essay has ever since had in it something of the author's philosophy of life. The reader gets the writer's outlook upon life, and has as an interpreter of this pageant of a world a spirit whose viewpoint is nothing if not original. The familiar essay is perhaps more directly a "criticism of life" than are most other literary types.

The essence, then, of the familiar essay is its subjectivity, and on this account it has been called the "lyric of prose." It has this in common with the lyric, that it is the expression of a mood, thought, or feeling of its author. And its chief charm is that it reflects the author's personality in all its shifting moods. It owes allegiance only to the writer's whim and fancy, and of these it reflects all the lights and shadows and changing colors. Montaigne finds that his senses and even his reason delude him, and that what at first seemed to be steady growth and progress is but "a drunken, stumbling, reeling, ill-favored motion, like that of reeds, which the air casually waves to and fro." He discovers that "I now, and I anon, are two several persons," and in his essays he follows this Protean ego through all its forms and disguises. He allows his individuality free play, and thereby gives to his works an air of remarkable liveliness and truth. If the essay is a matter chiefly of whim and fancy, so are some of the most important things in life, such as falling in love, what I shall order for dinner, what house, suit of clothes, or automobile I shall buy. Subsequent essayists have followed Montaigne's example in this respect too, and have been at no pains to check their whims or to iron out the eccentricities of their character or opinions. Your familiar essayist is your true non-conformist. He must live his life in his own fashion; he never allows himself to be governed by custom or by considerations of prudence or foresight; and for the sake of independence he is content to live detached from the world. "An idle life I live in this place, as the world counts it," writes Smith in "Dreamthorp," "but then I have the satisfaction of differing from the world as to

the meaning of idleness. . . . I must be made happy after my own fashion, not after the fashion of other people. Here I can live as I please, here I can throw the reins on the neck of my whim." Lamb well illustrates this aspect of the essayist's temperament when he says, "Whatever is, is to me a matter of taste or distaste; or when once it becomes indifferent, it begins to be disrelishing. I am, in plainer words, a bundle of prejudices—made up of likings and dislikings—the veriest thrall to sympathies, apathies, and antipathies." This is a large part of Lamb's appeal. In every line there is the touch of personality; the subject chosen, the sequence of the thought, the turn of phrase, the epithet—all reflect the taste or distaste, whim or crotchet, of the author. The familiar essayist is a thorough-going individualist. He is naturally antipathetic to all those levelling tendencies of democracy and socialism which lead, in Mill's phrase, to "collective mediocrity." He cherishes his idiosyncracies, his prejudices, glories in his loves however unreasonable, goes his own way rather than the herd's, confesses to all sorts of social heresies, and will be nothing if not himself.

Indeed, the familiar essayist sometimes carries the portrayal of self to such length as to shock the sensibilities or tastes of certain more squeamish readers. Lamb in his essay on "New Year's Eve" confesses to "an intolerable disinclination to dying," and says, "I care not to be carried with the tide that smoothly bears human life to eternity. . . . I am in love with this green earth. . . . I would set up my tabernacle here." Shocked by the scepticism of this essay, Southey, in an article in the *Quarterly Review*, complained of the "absence of a sounder religious feeling" in the "Essays of Elia." Again, Lamb's apology of the morals of the Restoration comedy, in an essay which, though critical, is essentially personal too, called forth a remonstrance from Macaulay. Sometimes the familiar essayist utters confidences that other men would hug to their bosoms. Hazlitt confesses, "I like to be pointed out in the street, or to hear people ask in Mr. Powell's court, *Which is Mr. H——?*" Lamb speaks of "the measured malice of

music," and says, "I must avow to you that I have received a great deal more pain than pleasure from music." "I have sat through an Italian opera, till, for sheer pain, and inexplicable anguish, I have rushed out into the noisiest places of the crowded streets, to solace myself with sounds which I was not obliged to follow." In another essay Lamb confesses, "I know less geography than a schoolboy of six weeks' standing. . . . I have no astronomy. I do not know where to look for the Bear, or Charles's Wain; the place of any other star; or the name of any of them at sight. I guess at Venus only by her brightness. . . . Of history and chronology I possess some vague points. . . . My friend M., with great painstaking, got me to think I understood the first proposition in Euclid, but gave me over in despair at the second. I am entirely unacquainted with the modern languages; and, like a better man than myself, have 'small Latin and less Greek.' I am a stranger to the shapes and texture of the commonest trees, herbs, flowers. . . . Not that I affect ignorance—but my head has not many mansions, nor spacious; and I have been obliged to fill it with such cabinet curiosities as it can hold without aching." Another illustration is Smith's confession that though he still goes to church, from habit, he has long since "lost the power of following a discourse." But confessions such as these are comforting. Thus does the familiar essayist win our love. Here, we say, is a great man without vanity or pretension. This is human; and we claim fellowship with genius through the possession of common frailties and "amiable weaknesses."

Out of the subjectivity, which constitutes the chief distinguishing feature of the essay, spring other minor, but no less characteristic, traits. The first of these is its diversity of subject. Since the familiar essay is essentially a portrayal of personality, any subject will serve that is capable of being treated in a familiar way. Montaigne writes on "Smells and Odors" and on "Prayers and Orisons," on "Moderation" and on "Drunkenness", on "Thumbs" and on "The Affections of Fathers to their Children." Lamb writes of "The Decay of

Beggars in the Metropolis," of "Old China," of his "Relations." Cowley writes on "Myself;" Smith on "The Writing of Essays" and on "Books and Gardens;" Hazlitt on "Going a Journey," on "Persons One Would Wish to Have Seen," on "The Conversation of Poets," and the "Pleasure of Hating." Lamb writes "A Dissertation upon Roast Pig," and Hunt, an essay on the "Graces of Pig Driving." Sometimes, as in the last mentioned essay, the writer seems to choose the least promising subject in order to show what can be done with it by an ingenious fancy and a ready pen. But generally the essayist writes upon whatever interests him most, and finds one peg as good as another on which to hang the spoils of his reading and meditation.

Writing on a familiar subject in an intimate way, the familiar essayist naturally writes in a familiar style; and, since his work is subject only to his whim or mood, without method. "I have naturally a sportive and familiar style," writes Montaigne, "but it is a style of my own, useless for public business; like my talk, in every way—too angular, disjointed, abrupt, peculiar to myself." Lamb says that Temple seems to have written "in his elbow chair and undress." That is true of most of the familiar essayists. Their style usually is that of good conversation, seeking naturalness, simplicity, animation and ardor rather than elegance or ornamentation; retaining much of the first glow of thought, not finicky or nice; full of fine daring; bending to the mood of the writer; now racy of the soil, now spun of the gossamer tissues of poetry; a style "calculated to be read out" and "allied to spirited conversation;" a style that reflects most to the life the personality of the writer. "The way of speaking that I love is natural and plain," says M., "as well in writing as speaking, and a sinewy and significant way of expressing one's self, short and pithy, and not so elegant and artificial as prompt and vehement." The familiar essayists have often been men great in conversation, "tall men of their tongues,"—Montaigne, Lamb, Hunt, Hazlitt, Stevenson. Montaigne, for example, finds the use of conversation "more sweet than of any other action of life."

"I love stout expressions amongst gallant men, and to have them speak as they think." "I love a strong and manly familiarity and converse;—it is not vigorous and generous enough if it be not quarrelsome, if civilized and artificial, if it treats nicely and fears a shock." This love of masterful conversation has entered into the warp and woof of Montaigne's style, and through him into the style of the familiar essay in general.

The style of the familiar essay is conversational because the familiar essay *is* a conversation, a *causerie*. And as a man would be only a bore who should talk by heads and sub-heads, the essay is immethodical. Logical sequence, thoroughness and exhaustiveness it heeds not. The familiar essayist is incapable of a straightforward march; he is no soldier or professional walker. He follows a wayward path, dallies along the road, gathers flowers by the way, and cares not whether he reaches the inn before nightfall. He will put himself to no labor or inconvenience for the sake of order or completeness. Not to "purchase the glory of Sallust" would Montaigne carry out the wish of some of his friends that he write a history of his time. "I would not give myself the trouble, being a sworn enemy as I am to all obligation, assiduity, and perseverance: besides that, there is nothing so contrary to my style, as a continued and extended narrative, I so often interrupt, and cut myself short in my writings only for want of breath." The true essayist has never heard of unity, and might not pass an examination in Freshman composition. What unity he achieves is fortuitous, the accident of his mood. To write on the subject proposed by the title he is under no obligation. Montaigne writes an essay entitled "Coaches," but there is barely a coach in the piece. Under the head of "Old China" Lamb writes of his and his sister's life in their earlier days of poverty. "What are these things I scribble," Montaigne asks, "other than grotesques, and monstrous bodies, made of dissenting parts, without any certain figure, or any other than accidental order, coherence or proportion?"

But this lack of all formality in style and arrangement is one

of the definite charms of the essayist's art. Such is the diversity of mood that neither writer nor reader has time to tire. The bonds between them are the silken ones of pleasure, not the iron bonds of logic or rigorous necessity. The writer may begin pretty much where he wishes and end for no better reason than "want of breath." He has no point to prove, no system to expound, no story to develop to a climax, no view to impose upon others. He writes only so long as the talk flows, and the reader follows with a sense of ease and exquisite repose. The disorder is in reality an effect of high art. Want of method is the best method to give the impression of real talk and the personality of the author in all its life and movement.

The familiar essay, then, is familiar in style, familiar in the subjects chosen, and familiar in that it portrays the author's personality. These are its chief characteristics and the marks by which it is distinguished from all other kinds of essays. Political, historical, scientific, economic, theological, critical, and philosophical essays are sometimes written in a more or less familiar style, but they are all methodical and objective; they move in accordance with the exactions of the subject, and belong to literary types very different from that of the familiar essay. With this they have nothing in common save comparative brevity. That the familiar essay has affinities with other literary modes we have already suggested. By its subjectivity it is related to the lyric. It is allied to poetry also in that it contains usually a strong element of feeling, an emotional interest that springs out of the subjective transformation of external or objective impressions. Where this is lacking and we find only intellectual interest, we have something else than a familiar essay.

The familiar essay is allied to the autobiography, the familiar letter, and the journal by the fact that all three portray the ego. The familiar letter and the journal are, in addition, written in a gossipy, familiar style, and are usually immethodical. But all differ from the essay in important particulars. The autobiography is concerned with events and chronology,

with the acts and incidents of the author's past life. The essay is of the present, and is concerned with the inner rather than the external man; with his thoughts and feelings more than his doings. "It is not my acts that I write," says Montaigne "it is I, it is my essence." The letter, if it be truly a letter and not an essay in disguise, is written to a particular person. It is dual, not single; and the mood is shaped and determined as much perhaps by the recipient as by the writer. The essay is addressed to the impersonal, general reader and is meant to be read by many instead of one; it is public rather than private. The letter, too, is concerned much more with the temporal and the provincial; it springs out of the facts, circumstances, and doings of the moment. It is "newsy." The essay is of the permanent rather than the temporary, and of the universal rather than the parochial. The journal or diary may be like the essay in having a personal element and in including miscellaneous subjects. But it is not essentially subjective, and its unity—unlike that of the essay, which depends upon the central mood or whim—is determined by the accidents of a certain period of time, usually a day. The journal is written, in most cases, for the author alone, not to a correspondent, as is the letter; nor for the general reader, as is the essay.

The characteristics of the familiar essay as we have outlined them are found in full flower in Montaigne. Montaigne, as Hazlitt phrases it, was "the father of this kind of personal authorship among the moderns." He was the first to call his writings "essays," and I have all along spoken of this Frenchman as if he were one of the English familiar essayists, because to all intents and purposes he is. Through the two admirable translations of his essays, by John Florio in 1603, and by Charles Cotton in 1685, Montaigne early became an English classic, an author whom English readers and writers made their own in a peculiarly intimate way. It is to his essays that the English familiar essay in all its essentials owes its chief inspiration and being. Almost without exception the English writers in this kind have been great readers and

admirers of Montaigne. He has furnished them many a theme to write on, and in many passages they reflect his thought. In our study of the characteristics of the familiar essay we have throughout used Montaigne as a touchstone because he was the creator of the form, and the English familiar essay has remained essentially true to its prototype. Montaigne was the first to make "himself the subject of his book," and, in Hazlitt's phrase, "the first who had the courage to say as an author what he felt as a man." The history of the English familiar essay begins in France, and a lover of paradox might say that the first of the English essayists was a Frenchman.

Not all of Montaigne's "Essays," however, are essays. In his admirable work, "Les Sources et l'evolution des Essais de Montaigne," M. Pierre Villey has shown that Montaigne's first compositions are altogether impersonal and belong to a form of composition, much in vogue in the sixteenth century, called the *leçon morale*, in which the author or compiler sought to popularize learning by collecting under some one subject, usually a moral one, "sentences," apothegms, and "examples," culled from the ancients. In these early compositions there is no originality, no revelation of self. Montaigne seems as yet not to have learned to think for himself, or at least to trust his own thoughts and judgments. The essay was not yet born. Gradually, however, partly through the influence of Plutarch and Horace, and largely by his natural independence and scepticism of mind, he introduces more and more his own ideas and experiences, and eventually forms the project of portraying himself. In the preface to his volume of 1580, written after adopting this purpose, he warns the reader, "myself am the groundwork of my book . . . it is myself I portray." The change was a transformation, and Montaigne's later compositions are original creations and constitute what was then a new literary form—the essay.

This is most important. Montaigne's originality consisted in his writing of self. What made the essay an essay, a literary form distinct from such older modes as the moral "lesson,"

the treatise, or the collection of wise saws and ancient instances, was his making the ego the center of his work, together with all the changes of style which this brought with it. This alone justifies his remark, "Authors communicate themselves to the people by some special and strange mark; I, the first by my universal being, as Michael de Montaigne, not as grammarian, or poet, or juris-consult." And again, "My work is the only one in the world of its kind." But we must remember that Montaigne himself failed to distinguish between his earlier and his later compositions. The volume of 1580, which contained examples of both, he published under the title "Essays." This want of discrimination, I believe, explains much of the looseness in the subsequent use of the term "essay." When the first essayist was thus uncritical, we cannot wonder that the term came to be used, especially in England, for almost any kind of short prose composition.

The essays of the first English essayist, Lord Bacon, are not truly familiar, and although his first essays were published in 1597, seventeen years after the appearance of Montaigne's first volume, they owe to Montaigne little save their title. Bacon's earliest essays, as Montaigne's earliest, belong in type to the collections of proverbs, precepts, and "lessons" which were so popular in the sixteenth century in England, France, and Italy, and in the strict sense are not essays at all. In two subsequent editions, those of 1612 and 1625, Bacon furbished up the original ten, and added forty-eight new ones. In the twenty-eight years between the first edition and the third, Bacon's essays undergo change and development, but none of them are of the type created by Montaigne. In the later essays Bacon expands his thought somewhat more fully, introduces a few personal allusions and recollections, and employs concrete illustrations for the enrichment of his subject. To the example of Montaigne these changes are probably to be traced. But Bacon never adopts the form of Montaigne's essays, he never makes himself the subject of his work, and never establishes intimate relations with the reader. Bacon's work throughout is of a different kind from the later and distinctive

work of Montaigne. For example, Bacon often develops his subject in an orderly fashion in accordance with a clearly indicated plan—a thing Montaigne abhorred. Moreover, some of Bacon's latest essays seem to be little monographs on certain passions and virtues, tentative to an exposition of a science of morals, which, we know from "De Augmentis," he proposed to write. Nothing is more opposed to the manner of Montaigne than a systematic study of this kind. The chief influence of Montaigne upon Bacon is found not in the latter's essays, but in his philosophical works. In his scepticism, in his consistent basing of his conclusions upon experience, Montaigne prepared the way for Bacon's formulating the experimental method of the sciences. The first English essayist who followed the form of Montaigne and wrote the first familiar essays in English was not Bacon, but Sir William Cornwallis, who published his "Essays" in 1600 and 1601.[1]

Bacon's essays are rather in the nature of small treatises. He conceives of the essay not as an instrument for the discovery and delineation of self, but as a treatment of a variety of subjects, civil and moral, according, in his own phrase, to "a small model." In his essay on "Usury," for example, he considers the subject under formal divisions: the incommodities and commodities, the reformation and regulation, of usury. This is nothing more than an epitome or preliminary sketch of what might have been a large treatise on a subject that belongs to economics or statecraft. Other less formal essays seem to be but fragmentary notes on great subjects, *disjecta membra*, such as could be jotted down in a single sitting by a busy mind in the intervals between more serious and exacting intellectual pursuits or attendance upon public affairs.

The great difference between Bacon's essays and the familiar essay is that Bacon's are almost entirely impersonal. The contrast is to be seen by comparing his essay "Of Gardens" with Sir William Temple's "On the Gardens of Epicurus."

[1] The above paragraph is based upon M. Villey's study "Montaigne a-t-il eu quelque influence sur François Bacon," *Revue de la Renaissance*, XII, 121–158, 185–203; XIII, 21–46, 61–82.

In Bacon's there is an occasional personal note, as in the sentence "God Almighty first planted a garden, and, indeed, it is the purest of human pleasures." In this the author rises more nearly to the point of enthusiasm than usual, but the greater part of the essay consists in a long list of flowers that should be planted for the different seasons of the year, and of details concerning the plan and size of what Bacon considered to be a princely garden. Temple's essay, though it contains numerous practical suggestions, moves in an altogether different atmosphere. After a considerable "ramble into Ancient Times, and remote Places," he turns to consider the "humour of our Gardening in England." He defends the English climate and reports that fine saying of the king's that "that was the best Climate, where He could be abroad in the Air with Pleasure, or at least without Trouble and Inconvenience, the most days of the year, and the most hours of the Day; and this He thought He could be in England, more than in any Country He knew of in Europe." Temple speaks of the "almost perpetual Greenness of our Turf" and of its "fineness of Blade." With the true gardener's pride he tells us that "the French who have eaten my Peaches and Grapes at Sheen in no very ill year, have generally concluded, that the last are as good as any they have eaten in France on this side Fontainebleau, and the first as good as any they have eat in Gascony;" "Italians have agreed, my White Figs to be as good as any of that sort in Italy," and "My Orange-trees are as large as any I saw, when I was young in France, except those of Fontainebleau, . . . as laden with Flowers as any can well be, as full of Fruit as I suffer or desire them, and as well tasted as are commonly brought over, except the best of Sevil and Portugal." And he adds, delightfully, "Thus much I could not but say, in defence of our Climat." He concludes, "I may perhaps be allowed to know something of this Trade, since I have so long allowed myself to be good for nothing else. . . . For my own part, as the Country Life, and this part of it more particularly, were the Inclination of my Youth itself, so they are the Pleasure of my Age. . . . Though among the Follies of my Life, Building

and Planting have not been the least, and have cost me more than I have the confidence to own; yet they have been fully recompensed by the sweetness and satisfaction of this Retreat, where since my Resolution taken of never entering again into any Publick Employments, I have passed Five Years without ever going once to Town, though I am almost in sight of it, and have a House there always ready to receive me." The difference here is not merely that Temple's essay is more subjective, but that it is conversational, chatty, and informal, and has glow and warmth.

The familiar essay, moreover, has nothing in common with the spirit of expediency or utility that animates many of Bacon's essays, nor with his apparent aim to popularize knowledge. That his "essays" were more "current" than his other works he ascribed to the fact that they "come home to men's business and bosoms." That Bacon was much concerned with "business" is seen in the frequent occurrence of the word, sometimes twice on the same page. True, he uses it more broadly than we do—in the sense of "affairs." But the spirit of many of the essays is a purely practical one. "Of Plantations" is a compendium of advice to those who would found colonies. To plant a colony with "the scum of people and wicked condemned men" is a shameful thing. You should plant with "gardeners, ploughmen, laborers, smiths, carpenters, joiners, fishermen, fowlers, with some few apothecaries, surgeons, cooks, and bakers." The rest of the essay is a list of grains and vegetables that should be planted, industries that should be started, and policies that should be followed. "Of Regiment of Health" is a sort of practical Household Medical Guide. "Beware of sudden change in any great point of diet. . . . Examine thy customs of diet, sleep, exercise, apparel, and the like, and try in anything thou shalt judge hurtful to discontinue it little by little." In some of the essays Bacon's attitude is that of the shrewd man of the world, his counsels the counsels of prudence, and his philosophy the philosophy of getting on. In "Of Great Place" he counsels, "Use the memory of thy predecessor fairly and tenderly,"—but not, won't you note, because that

is the only honorable thing to do, but because "if thou dost not, it is a debt will sure be paid when thou art gone." "Of True Greatness of Kingdoms and Estates" contains passages on the virtues of war and the wisdom of having convenient excuses for war that are worthy of Machiavelli or a German professor.

I cite these things not to disparage Bacon, but to point out that his essays are not familiar essays; that they are, in fact, of a separate and distinct type. Bacon never intended to write familiar essays. His conception of the essay, of its uses, purpose, and form, is from first to last different from that held by familiar essayists. In the type of essay he evolved he achieved very great success, but it was a type destined to be comparatively unproductive.

Bacon's greatness as a philosopher and his position as first of English essayists in point of time, have given his essays a reputation altogether disproportionate to their historical importance in the development of the essay in England. On the subsequent history of the English essay—I speak now of the essay in general, not merely of the familiar essay—the influence of Bacon is slight. What he has had, has been in the matter of style, in the development of a clear, simple, forceful prose; and in the trick of aphorism, which is seen again in several later essayists, even in the nineteenth century in Hazlitt. On the whole, the English essay develops along other lines than those laid down by Bacon. One or two minor essaysists of the seventeenth century follow Bacon's lead; as Nicholas Breton and Owen Felltham. Reminiscences of his thought are found occasionally in Cowley, Clarendon, and Temple. But the major essayists of the seventeenth century are indebted to Montaigne rather than Bacon. Sir Thomas Browne before the Restoration, and Abraham Cowley and Sir William Temple after the Restoration, write in the familiar, self-disclosing manner of Montaigne. At the beginning of the eighteenth century Steele and Addison create a new type of essay. This has antecedents in the seventeenth century, but is in no particular indebted to Bacon. This new type prevails

throughout the eighteenth century, and exerts a strong influence upon the nineteenth. In the nineteenth century there are essays that trace their descent from Steele and Addison, from Sir Thomas Browne and Montaigne, but none of the type of Bacon's.

The essays of Steele and Addison have certain traits in common with the familiar essay, but are not themselves familiar essays. They are written largely in the first person, and in a style that is more or less conversational; they contain many personal experiences, anecdotes, and opinions, and are on familiar subjects, or subjects of general human interest. Many of them open with a paragraph of generalized observation, on some aspect of life, that is analogous to the personal reflections of the familiar essayist. The rest of the paper consists usually in an ancedote, an experience supposed to be out of the author's life, or a description of some character about town, used as a concrete illustration of the thought of the first paragraph. In these papers there are certain autobiographical elements, especially in the writings of Steele; and occasionally we come upon a passage in the manner of the true familiar essayist, which brings us very close to the writer himself; as this, from Steele's essay on "Late Hours:" "For my own part, I value an hour in the morning as much as common libertines do an hour at midnight. When I find myself awakened into being, and perceive my life renewed within me, and at the same time see the whole face of nature recovered out of the dark uncomfortable state in which it lay for several hours, my heart overflows with such secret sentiments of joy and gratitude, as are a kind of implicit praise to the great author of nature. The mind, in these early seasons of the day, is so refreshed in all its faculties, and borne up with such new supplies of animal spirits, that she finds herself in a state of youth, especially when she is entertained with the breath of flowers, the melody of birds, the dews that hang upon the plants, and all those other sweets of nature that are peculiar to the morning."

But for the most part the personal element in these periodical essays is no greater than that found in the most objective

writers,—in dramatists, novelists, or short-story writers. In these, we know something of the writer by the very stories he tells, by the characters he paints, and the thoughts he puts into their mouths. We see very clearly Steele's opinions on duelling, on women, on marriage; and in a sense we thus come to know his personality. But in the same sense we know Shakespeare in his dramas, or Thackeray in his novels. To express an opinion is not to write of one's self. Moreover, Steele and Addison write not only under assumed names, but under assumed characters. The Isaac Bickerstaff of the "Tatler" is a very different person from his creator, Dick Steele. Lamb, on the other hand—a true familiar essayist—though writing under the name of "Elia," illustrates the character of Charles Lamb.

Apart from these things, the aim of the periodical essayists is very different from that of the familiar essayist. Their purpose is threefold—to report foreign and domestic news and the doings of the town; to afford entertainment, especially for "the fair sex;" and to reform manners, correct abuses, and improve public taste. To these ends they employ many kinds of writing—narratives that are almost short stories, letters, character sketches, and satire. Most of these papers are to be classed either as fiction, social satire, or literary criticism; and usually the writer has an ulterior object in view. He seeks to entertain or influence others. He writes on duelling in order to make it ridiculous and laugh it out of existence; on the taking of snuff, to check a monstrous affectation. In the character sketches and narratives, he paints the manners of the time. "All the actions of men are our subject," Steele declares, and he gives a close and realistic study of life. But it is a study of life localized and set in a particular time, the life about town in the age of Queen Anne. It is also more objective than subjective.

The familiar essayist, on the other hand, has no desire to instruct or to bring about reform. "I am not sufficiently taught," says Montaigne, "to instruct others." "I take pleasure in being uninterested in other men's affairs, and disengaged

from being their guarantee, and responsible for what they do." The familiar writer is concerned simply with his fantasies, his moods and whims, his disinterested observations of life. He wishes but to possess his soul in peace and to reap the full enjoyment of self. If he writes, it is from a certain necessity to speak out what is in him, or from sheer zest in his own thoughts, and delight in communication. He has no more purpose of persuading or reforming or even of entertaining than has a man engaged in pleasant and well-bred conversation, or than a rose in shedding perfume. Nor does he paint life so much as reflect it, and he is concerned with the universal and permanent aspects of life rather than the local and the temporal. Old Montaigne sitting in his tower in Gascony, meditating on the complexities of human nature, prying into and studying himself, is a proper symbol of the familiar essay; or Alexander Smith, gardening, gossiping, and philosophizing in his rural retreat in Dreamthorp. Lamb, it is true, is of the town; but as he goes about, amidst "the sweet security of streets," and writes of the shops and street-cries, beggars and chimney-sweeps, the old Temple and the South Sea House, these things, like so many lamps of the city, do but illuminate the more his own personality.

The example set by Steele and Addison was followed by their successors, and the great majority of essays produced through the remainder of the eighteenth century were periodical essays of the type of the "Tatler" and "Spectator." With the nineteenth century a new form came into vogue. The subjectivity of the age was a kindly and fostering soil for the cultivation of familiar writing, and it is in the nineteenth century that the familiar essay in England comes really into its own. It is an age of great names in the history of the genre—Lamb, Hunt, and Hazlitt, Thackeray, Alexander Smith, and Stevenson—and of many lesser names. No one of these, however, is the egotist to the extent of Montaigne. No one of them, not even Lamb, makes himself the subject of his book, and all have written essays that are not familiar.

In Lamb's "Essays of Elia," for example, "Some Sonnets of

Sir Philip Sidney," "The Sanity of True Genius," "Stage Illusion" and the like are critical papers. "Mrs. Battle's Opinions on Whist" is a character sketch having affiliations with the periodical essay of the eighteenth century. "Poor Relations" in part suggests the seventeenth century "character." Hunt, Hazlitt, Thackeray, and Stevenson write critical essays as well as familiar. Many of Hazlitt's essays, even in "The Round Table," "Table Talk" and "The Plain Speaker" are analytical studies of abstract, metaphysical, or artistic subjects. His essay "Thought and Action" moves in accordance with the exactions of logic, and is familiar only in a personal touch introduced here and there. "A Landscape of Nicholas Poussin" is a critical essay, save in the fine concluding passage on Hazlitt's love of pictures.

Thackeray's essays are perhaps those in the nineteenth century which most nearly resemble the periodical essays of Steele and Addison. Especially has Thackeray many points in common with Steele. His subject is the manners and doings of the town; only, the club has taken the place of the coffee-house. He is a mild and genial satirist of the follies and vanities of society. In the guise of Mr. Brown, an elderly uncle who has been a young blood in his day and now writes letters of moral and social advice to his nephew who has newly come upon the town, he is a successor of Isaac Bickerstaff. Like Steele, too, he dwells much on the praise of woman, and he has an essay on the "Influence of Lovely Woman upon Society." Many of the essays are sketches, in which he is the novelist painting the fashionable mid-victorian life—the dinners and balls of the *beau monde*. Especially prominent is what may be called the literature of the mahogany—papers celebrating the noble art of dining; such as "Memorials of Gormandising," "A Word about Dinners," "On Some Old Customs of the Dinner Table," "Great and Little Dinners." But that was in the days when a man might eat heartily and not be vulgar; the days before Shaw and the vegetarians.

There are more genuinely familiar essays too. In "De Finibus" and "On a Peal of Bells" he gossips of heroes and

heroines, and the characters of his novels. And in all his essays and sketches Thackeray the man is very close to us. Ever prominent are his inextinguishable gaiety, his abundant animal spirits, his robust enjoyment of life, his admiration of unaffected simplicity and all genuineness, his scorn of all meanness, humbug, littleness, cant, and hypocrisy. His essays are written in a style that is the perfection of good talk, easy, fluent, racy and familiar; and they should be better known than they are.

Of the modern essayists, perhaps Lamb and Stevenson are most truly familiar. But of them what need be said? Not only are they the most beloved of English essayists among present-day readers, but the best known.

Hazlitt, I think, has not had his due. He has been eclipsed by his friend and contemporary Lamb, and the reasons are not far to seek. Lamb's humor—whimsical, profound, often directed against himself—his altogether lovable character, his unerring wisdom and fine idealism, are qualities that endear him to all. "The thrice-beloved Lamb," he has been called; and by Thackeray, "Saint Charles." Hazlitt's personality, on the other hand, as disclosed in his familiar essays, is one that repels quite as much as it attracts. Outbursts of spleen, bitterness, and scorn are frequent. His judgments of men and things are often violently prejudiced. In his lifetime he made enemies as Lamb made friends. But from the disinterested critical viewpoint Hazlitt is perhaps as great a familiar essayist as Lamb. We may not *love* him as much, but that is neither here nor there. He is comparatively lacking in humor, but a writer is not bound to be humorous; and though Hazlitt wants humor, he has abundant wit. Fine things are scattered up and down his pages, and for far-glancing brilliancy and suggestiveness, he is unexcelled among English essayists. There are passages of a force equal to Carlyle's own. His style never halts for a word, and it has an invariable precision that stamps the idea upon the page or the reader's mind with all the definition of a fine intaglio. Hazlitt's range is immeasurably greater than Lamb's, in all but his sympathies. Lamb's large humanity and kindliness appeal to our love of sentiment. But Hazlitt's

fine indignation, his hatreds and antipathies, are to your true reader just as *interesting* as Lamb's loves. "Lamb always took things by the better handle," Hartley Coleridge once remarked in a letter to Moxon. Hazlitt took a good many things by the worse handle, but he is none the less a great familiar essayist for so doing. "He had the courage to say as an author what he felt as a man," and his essay "On the Pleasure of Hating" is as interesting a revelation of personality as Lamb's on "Poor Relations' or "Imperfect Sympathies." Much of Hazlitt's "unpleasantness" arises out of his discerning knowledge of life. He knew too much and saw too clearly to have any great opinion of human nature, and he was too honest, too little the sentimentalist, to gloss over the facts as he saw them for the sake of those readers who prefer flattery to truth. In the pursuit of light it is not always possible to maintain sweetness; and in any sound system of morals, hating well is quite as important as loving well. Thackeray was a good hater, and a large part of the world has not yet forgiven him for not shutting his eyes to knavery, snobbishness and humbug, and loving like Dickens. A good hater, too, was Carlyle. Hazlitt hated not always wisely. Moderation, tolerance, accuracy were not among his virtues of the head; but to complain of this in a familiar essay is like complaining that Hazlitt is not Lamb.

Furthermore, there is another side of Hazlitt that is altogether fine; Hazlitt the lover of pictures, of old books, of Shakespeare and Milton; Hazlitt dwelling upon the memories of youth and the love of the country; the poetic, eloquent, and most tender Hazlitt in the essay "Why Distant Objects Please." A judicious selection of the best of his familiar essays, out of the twelve bulky volumes of his complete works, would make a collection equal to any in English, in point of charm as well as in faithful revelation of personality. What enthusiasm is there in the "Pleasures of Painting"! What fine feeling in the "Past and Future"! Ranging through literature, painting, esthetics, life, Hazlitt writes always with gusto; and essays such as "On Going a Journey," "On Sitting for One's Picture,"

"On the Ignorance of the Learned" are examples of the familiar essay at its best. Of the first, Stevenson says, it "is so good that there should be a tax levied on all who have not read it." "Give me the clear blue sky over my head," writes Hazlitt, "and the green turf beneath my feet, a winding road before me, and a three hours' march to dinner—and then to thinking! It is hard if I cannot start some game on these lone heaths." "How fine it is to enter some old town, walled and turreted, just at the approach of nightfall, or to come to some straggling village, with the lights streaming through the surrounding gloom; and then after inquiring for the best entertainment that the place affords, to 'take one's ease at one's inn!' "

We have touched upon but few of the familiar essayists, but I hope we have obtained an idea of what a familiar essay is. It is a study of personality, the literature in which a man "takes leave to egotize." It is no very ambitious kind of writing, but one of the most delightful and most lasting. Its appeal is ever to the individualist; it is one of the chief gospels of individualism. With the present it is rather out of tune, though to many it is a sweet refuge from the deluge of socialisms and the preaching of new duties—duties of the "religion of humanity" and of "social service." The familiar essayist has no axe to grind. With a certain detachment he sits at the spectacle of life, and gives for what it is worth his sense of its beauty or ugliness, its mystery and fascination. "I am devoured by an unappeasable curiosity," says Alexander Smith, "as to the men who do act. I am not an actor, I am a spectator only. My sole occupation is sight-seeing. In a certain imperial idleness, I amuse myself with the world." Reformers therefore find the familiar essayist an exasperation unto the soul. With Lamb's "Complaint of the Decay of Beggars," for example, they are out of all patience. But that is precisely the chief glory of the familiar essayists. You cannot hitch them up; and they have nothing in common with present-day propagandists who consider literature as a handmaid to social reform, and look upon the novel and the play, for example, as pulpits with big sounding-boards.

Nor has the familiar essayist any points of contact with the contemporary literature of pessimism. By living his life in his own way and not meddling with others, he contrives to find life pleasant. He has a fine capacity for pleasure, for little pleasures. "My chaffinch's nest, my swallows . . . with their nests in the corners of my bed-room windows, my long-armed fruit-trees flowering against my sunny wall are not mighty pleasures, but then they are my own, and I have not to go in search of them." Often today we seek refuge in the palace of art only to find it a chamber of social horrors, only to discover anew the malady of thought, and additional reasons for being dissatisfied with life. Of much contemporary literature it may be said that reading it is, like the reading of newspapers, a perpetual conviction of the intolerableness of life. To this the familiar essay is a pleasant antidote. It has optimism without shallowness, and it finds life, if not always comfortable or beautiful, altogether interesting. The familiar essayist is a man of infinite zest. Montaigne speaks of the "jollity and delight wherein I now live," and finds relish even in cursing his servant. "When I rattle my servant I do it with all my mettle, and load him with no figured, but downright, real curses." Hazlitt writes even of hatred with a fine gusto. Stevenson has an essay "On the Enjoyment of Unpleasant Places." In it he says, "Wherever a man is he will find something to please and pacify him: in the town he will meet pleasant faces of men and women, and see beautiful flowers at a window; or hear a cage-bird singing at the corner of the gloomiest street." Lamb, quarreling with death, exclaims, "Sun and sky, and breeze, and solitary walks, and summer holidays, and the greenness of fields, and the delicious juices of meats and fishes, and society, and the cheerful glass and candlelight, and fireside conversations, and innocent vanities, and jests, and *irony itself*—do these things go out with life?" The spirit of the question is typical of the familiar essayist's power of enjoyment.

Hazlitt remarked of Lamb that he tried old authors "on his palate as epicures taste olives." In the same way it may

be said, the familiar essayist tastes life; he is an epicure of life, trying on his mind its many flavors, "palating" and relishing. If George Gissing's dictum is true that art is "an expression, satisfying and abiding, of the zest of life," the familiar essay is one of the high forms of art.

JEROME CARDAN AS SEEN BY AN ALIENIST

By Charles W. Burr
Professor of Mental Diseases.

I purpose to sketch the history of a certain man whom you doubtless learned a little about in your school days as the inventor or discoverer of an algebraic formula which you were compelled to study—perhaps you did it willingly—and whom you then, boy-like, instantly forgot. Probably few of you have heard or read anything about him since, for today he is well-nigh forgotten, though he was of much importance in his own time and had an influence on thought for many years after his death. I am well aware that the newest, though not the wisest (novelty and wisdom are not synonymous), school of pedagogy holds violently and somewhat hysterically to the belief that the past can teach us nothing; that it is a waste of time for the schoolboy of today—not only the ordinary boy, he can not take much learning, but also the rarer one gifted by the gods with intellect—to study the ancient world; that dead men not only tell no tales but also point no morals; that vocational training is the thing; that newspapers should be text-books of history because only the events of the day are historic, are of value in instructing us how to live; and that human nature has so changed and American human nature (some mysterious influence making every immigrant an American) become so improved that the motives acting on the old, dead world, the ambitions which moved it, the beliefs which held it in something like equilibrium, the ideals which controlled it, are all dead and everything is to be wiped out and the millennium arise; a new world, perfect and complete and all man's handiwork, is suddenly to emerge from the womb of time. Unfortunately for the correctness of the view of these dear, optimistic and much-believing pedagogues, human nature has not changed nor its mentality increased since primitive man gnawed cracked

bones for his food, scratched pictures on the walls of the caves in which he slept, and saved himself from extinction by being ever ready to fight. I am professionally and technically interested in biography and history because madness and imbecility have played a large part in the world's biography, the former, paradoxical as it may seem, not always for evil, and never a larger part than they are playing now. I do not mean, as you doubtless are suspecting, in Europe; on the contrary, this war is proving that in the old world men and women are normal; react mentally and emotionally, healthily to stimuli; are physiological, not pathological. I mean right here in America. To an alienist there are many signs of degeneration visible in this country and not the least important of them is the attitude many of us have assumed toward present events in Europe, and I purpose to take the life of a sixteenth century physician, mathematician, gambler and astrologer, and to show how much healthier his training for life and his surroundings was, notwithstanding hardship and low material standard of living in his time, than much of our training and our surroundings are today, notwithstanding the eight-hour day, universal education, sumptuary laws, high wages and low salaries, bisexual suffrage, the brotherhood of man, the cry of "safety first" and all the rest. He lived in a world of realities, we in a dream; he in a world of action, we, or some of us, in a land of words. I have chosen Cardan rather than some better remembered man for my text on which to hang a sermon, because his life was so full of dramatic incident, such a tragedy that even the dullest speaker can not help but interest his hearers. Just as the dyer's hand is bound to be stained, so is the alienist's mind to be tinted (ought I to say speckled?) by his work, so that just as King Charles' head always got into Mr. Dick's writing, so of necessity there runs through my sermon a thread of psychologic study of the man himself and this I trust you will not find altogether uninteresting, even though you may think, and for all I know, justly, that I am somewhat prejudiced.

So much for preliminaries. Now for Cardan. He was born in Pavia in 1501 and came unwished-for into the world. His

mother's relations with his father were irregular and she tried hard to prevent the boy's coming alive into the world, but failed. It took him three days to make the journey and he appeared on his arrival such a weak little specimen of humanity that he was not expected to live. He did, however, seemingly partly because of the good effect of a bath in wine but chiefly because he had stamina, a quality distinct from muscular strength and good nutrition. He was immediately handed over to the tender mercies of a nurse, who died of the plague within a month, and he himself was infected but survived. Speaking of his birth, many years after he said, "After a few days I fell sick of a dropsy and flux of the liver, yet nevertheless was preserved, whether through the wrath or mercy of God, I know not." He was a sickly child and boy and much neglected. His father, a distinguished man, a jurisconsult, the owner of a familiar spirit, a mixture of the dark ages and the new learning, as was also the son, holding high position and being a renowned scholar, paid little attentian to him, bore him no love in childhood and treated him as a little slave. His mother also showed him little affection. As a child he did not hear the stories more fortunate children learn from the lips of loving mothers and was not lulled to sleep by sweet lullabies, but heard one tale of horror many times repeated, one tale one sentence long, "it would have been better had you never been born." Do not blame the mother too much; rather pity, for her life had had little happiness. He never in later life spoke evil of his parents, but he wrote of his childhood of sickness, "up to my eighth year I had often beaten at the gates of death, but those within refused to open to me." Writing in mature life of his boyhood and referring to the intellectual isolation he endured (remember, he was an unusual lad who early began to think, to meditate on the world and all its abstract wonders; he shows no evidence of having been as a child much impressed by concrete, natural wonders, who very early broke the shell of unconscious egoism of childhood and realized his separateness from the world, and who hungered after knowledge at an unusually early period of life), he said, "I lived to myself and

in some hope of future things, despised the present." He was a child who would have stood little chance to have been conceived, let alone to have lived, in a world run on the principles of the most modern school of newspaper eugenics. If "the birth control" ladies and gentlemen had been ruling things he certainly never would have been conceived, and even as things were, his mother tried to prevent his having to endure the trials and tribulations of this world by endeavoring to send him to heaven before ever he was born. In Sparta he would, if it were thinkable that such a person as his father could have existed in that country, have been exposed and thus found an early end. Were such a child born in America today, his fate would depend on accident. Placed among old-fashioned, which being paraphrased means wise, people, he probably would develop into the same sort of man he grew into in Italy. If he were the victim of the new morality which assumes that words can alter realities, the new pedagogics which believes in making education sweet play, and the new hygiene, which consists in having so much fear of microbes that one's whole life is spent in avoiding death, only God knows what would become of him. As things really were, he received little formal education till he was seventeen years old. His father taught him, or allowed him to learn, reading, writing and arithmetic and gave him much instruction in astrology. Latin, the language of the scholar, he learned to chatter, but nothing of its grammar, by hearing his father converse with his learned friends; an education in itself; perhaps the best a thoughtful boy can have. He acted as his father's servant, even as a little boy, carried his green bag, or whatever was its then substitute, and performed all the functions of a menial. During his seventeenth year a change came in the father's attitude. The old man then realized the youth was no common boy, saw that he had the rare quality, intelligence, and began to show a real interest in him. Perhaps the old man, for Cardan was a child of old age, watched him more closely than he permitted to be seen, and saw, with more joy than he showed, the awakening of genius. If not, he was unlike most men of high mentality, because the greatest intel-

lectual pleasure is to watch the unfolding of a bright boy's mind. At all events, Cardan was prepared for and sent to the University of Pavia in 1521 and later to Padua, where he was graduated Doctor of Physic. Six years later he married, being a genius, though poverty stricken and having as he says "for the space of ten years before perceived himself an insufficient man." Strange portents preceded his wedding: a dog, usually quiet, howled continuously; ravens sat upon the house top and croaked; bundles of sticks, broken by a boy, gave forth sparks of fire. More remarkable than all, he saw his future wife in a dream all in white, before ever he had seen her awake and in the flesh. Of course, many youths have dreamed of maidens clad in white and faces are prone to be vague in dreams, but why should science spoil poetry and a story? He gives learned astrological, not physical, causes for his insufficiency. The modern spiritualists, who believe in rapping, may claim him for a brother. I, in my ignorance, do not know when in the world's history spirits began to rap, but he relates, among other instances, that when in Pavia, while in bed one morning and again while dressing, he heard raps on the wall separating him from a vacant room. At the same time his friend Rosso died. The interpretation of the rapping came after the event.

He was laureated in medicine at Padua, "the nursery of the arts," in 1526, after having been rejected twice, and received with all form and ceremony the open and the shut book, the barette, the ring and the kiss. He migrated to Sacco, a town about twelve miles from Padua, to practice medicine. During this time battle, pestilence and famine raged in Milan, but in 1529 war abated and Cardan made an attempt to settle there. He failed to establish himself and soon returned to Sacco, where he remained three or four years. While there he wrote a book on "Cheiromancy," an art in which he firmly believed. He also wrote "Upon the Method of Healing," a treatise on the plague, and several other papers. We owe to the misconduct of the family cat the loss of two manuscripts, one "De Re Venerea," the other on Spittle. He obtained some practice at Sacco, but continued to spend much time in gambling,

remember, all his life he was a gambler, banqueting and singing, for he was very fond of music. He sometimes got into quarrels while playing dice and cards and a story about one fight is worth telling. He was cheated at cards and wounded the offender in the face with a poinard. Then he seized all his opponent's money, but threw some of it back and went on his way, wandering about the city of Venice, rather fearful he might be arrested for assault, especially as the man was a senator, and in the evening fell into a canal. Lo and behold, when he was dragged out by unknown but friendly hands, he found himself in the gondola and presence of the man whom he had stabbed, and, somewhat to his astonishment, instead of being thrashed he was given a dry suit.

In 1529 his mother—he never was alienated from her in feeling even in boyhood and later she was a real friend to him—desired he should return to Milan. He did so and applied to be enrolled as a member of the College of Physicians. Membership was refused on the ground of suspected bastardy, in consequence of which he went back to Sacco hurt, insulted, ill. For seven months he was ill, but finally the Blessed Virgin cured him—not doctors. His taking no medicine may have helped some.

Again in 1532, after his marriage, he returned to Milan and was again rejected by the college. He struggled and fought against social prejudice, ill health and poverty. Soon he and his whole family went to Gallarate. Here he wrote more and more. In fact, all through life, when he had nothing else to do, he wrote, in this resembling some moderns, with, however, the difference that what he wrote had a habit of being interesting, while what moderns write is sometimes, even if not often, dull and useless. He somewhere excuses himself on physiologic-psychologic grounds for writing so much, saying, there are waste products in the mind as well as in the body and they must be gotten rid of in the one case just as in the other or evil will befall. His verbal style differs here as elsewhere from that of some recent teachers of the young, and had he been a modern professor of English in one of the up-to-date universities of the glorious western world he would have said, "you must get it

out of your system," this language being so much more picturesque , lucid and fresh. At this time he wrote on "Fate" and proved what some of us think does not need proving, namely, that events frequently happen contrary to human wishes, but that we must bear them philosophically. He also prepared a treatise on "Agrippa's Occult Philosophy," in writing which, he gravely informs us, great care was taken to exclude all fictitious marvels. At Gallarate his ever infirm health grew better and he became a father. As always, with Cardan, when anything happened, some portentous though trifling event preceded or accompanied it, so at the birth of the child a portent came. It was a wasp which flew thrice around the room, hurting no one, frightening everyone, and finally in trying to escape dashing itself against the window curtain, making a loud noise like a beaten drum. But when they ran to catch the wasp it disappeared, though there was no natural way in which it could have done so. The incident, being interpreted, meant that the boy's life would be short, his death sudden. The prophecy came to a terrible fulfilment, of which more later. Though he was richer by the possession of a son, he was growing poorer and poorer in worldly goods and more and more dependent on the dice box for his daily bread, till finally everything was gone, money, his wife's jewels, even his bed, and the family in despair returned again to Milan and applied for shelter at the Public Xenodochium, the workhouse of the time. He was not, however, altogether friendless. One Filipo Archinto, who had known him long, had him appointed to a scantily endowed lectureship and obtained for him some other little sources of income. Still the struggle was hard. He was compulsorily a vegetarian, but still he fought, still he endured, still he had faith in his power to conquer and be what he wanted to be—immortal. There never was a man who had greater and more childishly confessed desire for immortality of remembrance. At last he had a real patient, a man with a pocketbook and influence, and who was a good judge of men and, like most good judges and influential men, desirous of helping young and ambitious intellect whenever and wherever he saw it. I say

this notwithstanding the much-preached belief, with which a strong endeavor is being made to innoculate us today, that the powerful and successful always want to keep other people down, a belief that weak and mentally bilious men sometimes use as an excuse for their failure and professional "uplifters" always use in explanation of all failure. Cardan had been appointed, largely by Archinto's influence, physician to the Augustin Friars in Milan, of whom Francisco Gaddi was the prior. For two years Gaddi had been ill, melancholy, suffering from some skin disease and waiting to die, but by Cardan's skill, by some hidden process of nature or by the grace of God, he recovered after six months' treatment. This patient helped Cardan in many ways, but he still had plenty of leisure and wrote on "Circles," on "Geography," on "Euclid." He also invested in a mule, upon which patient beast he made his professional rounds, which means he was becoming a little, not greatly, but a little prosperous: he no longer had to visit patients afoot. His professional career was hindered by his miscellaneous writings. People were just as queer in his day as now, just as illogically logical, just as prone to judge others by the same yardstick with which they measure themselves, and hence they said a man who knows so much about other things can not know anything about medicine—because he can not have enough ability, just as people innocent of wisdom, childlishly lacking reason and possibly a little envious, say today, forgetting that nature, wilful and careless, gives infinite ability to one, emptiness to another. He realized this prevalent mental attitude and, not being either tactful or diplomatic and yet determined to be a medical author, he wrote and published a book with the astounding title, "The Bad Practice of Medicine by Physicians." Remember, he was not a member of the doctor's guild and was only, one may say, allowed to practice on sufferance. The book itself, though utterly unscientific, as it was bound to be, for there was no science of medicine in those days, only the art empirically learned, contained much sound advice, especially as to how to feed the sick, when to and when not to bleed and when to maintain an attitude of watchful waiting, a

procedure much wiser in medicine than in statecraft, because it includes being always prepared. This book, the first of his which came to printing, had a large sale, but the doctors criticized him with caustic tongue; they said a young man of no experience who had written about so many other things, and had had so little experience, could not know medicine. He put, said they, his crochets and notions against their wisdom. Years later, when he revised the book, he himself admitted finding more than three hundred blunders in it. The printer rejoiced, for he made a profit, the wide criticism it received increasing its sale, but Cardan was disheartened and said later, "when I looked for honor, I reaped only shame." Not long after the publication of the book an event happened which illustrates the superstitious side of his nature. Cardan was invited to attend Count Camillo Borromeo's seven-year-old sick son. The night before he was called in the case, he had a vision of a snake, which portended evil. When, therefore, on examining the boy, he found the pulse paused after every fourth beat, he decided that, though the child did not seem very ill, he would die. He had intended giving a powerful medicine, but he decided that if the child died after its taking he (Cardan) would be accused of killing him by the envious physicians and perhaps meet his own death at the hands of the angry father, with whom he already had quarreled about another matter. He therefore contented himself with prescribing a placebo and saying the boy would die. The prophecy was fulfilled. He always believed the dream had saved him from great trouble. In this matter of dreams it is interesting that there has arisen in recent years, probably as an unconscious revulsion from the rationalism of the nineteenth century, a school of psychologists called after their master, Freudians, who in a different way regard dreams as being as important a part of life as Cardan did. According to them, all dreams are symbolical, set free the repressed and often unconscious desires of the dreamer, and if you psycho-analyze a man's dreams, *i. e.*, interpret them by arbitrary symbolism, you can find the cause of many diseases, cure them by verbal exorcism, and furthermore find out all

about the nature of the man. Just as some men today claim Cardan was insane because, among other reasons, of his belief in dreams, so a hundred, or maybe fewer, years from now curious students of forgotten hypotheses of psychology may think, and perhaps rightly, that the Freudians are at least a little queer, a little twisted, but to say so today stamps you, in their opinion, as being a conservative, a reactionary, an intellectual Bourbon; and to be so tagged in these "uplift" and progressive days is very humiliating, because it means the most advanced thinkers think you were born too late, whereas you may have flattered yourself that you were born too early.

In 1536 he printed a little pamphlet on astrology. At about the same time he cast a horoscope of Our Lord and not long after printed a book on arithmetic. Now, too, he began to be of some importance as a physician, because he had obtained some important people as patients who finally compelled the physicians of Milan to accept him as a member of their body, whereby he obtained the legal right to practice medicine. In 1539, therefore, he was enrolled as a member of the College of Physicians of Milan. I must confess to having some sympathy with the members of the college in their lack of haste in admitting him, because he was a somewhat caustic critic of his fellow physicians and not the easiest man in the world to get along with, *e. g.*, he wrote, "the things which give most authority to a physician in these times, are habits, attendants, carriages, character of clothes, cunning, suppleness, a sort of artificial namby-pamby way; nothing seems to depend on learning or experience." This has a somewhat familiar sound, even in the twentieth century.

About 1543, war in Italy compelled the University of Pavia to go to Milan. As the professors had no assurance their salaries would be paid, and even in those simple days there were hard-hearted landlords expecting to be paid rent and rascally shopkeepers, "little business" men, who, though they might sell adulterated goods and give short measure, wanted pay in good coin, and money was, therefore, a necessity as well as an

evil, though the corporation moved or transferred itself, the faculty did not. In consequence, Cardan was offered a professorship in medicine. He accepted, for, being poor, he thought that even to have money owing to him was better than nothing. In 1544 the university, war having retreated, moved back to Pavia and Cardan was asked to go along. He was in grave doubt what to do, but one night while he, his wife and two children were in bed the house tumbled down over their heads, which surprising performance on the part of a perfectly stable and hitherto motionless building, being interpreted, meant he should go, and go he did at a nominal salary of two hundred and forty gold crowns.

The book of the great art, algebra, was published in 1545. As I am not a physician of the sixteenth century, when physicians were not only practitioners of medicine but scholars in all kinds of learning, but of the twentieth century when they are not only not masters of all learning but often only of some little, infinitesimal part of their own subject, I am entirely incompetent to discuss the book, even to describe it. Suffice to say that he ranks among the real mathematicians. I state this on the evidence of men competent to judge.

I have said he was an astrologer. He wrote much on this pseudo-science and cast many horoscopes, among them those of Petrarch, Luther, the Emperor Charles V, King Francis I, and his own. An apocryphal story is told that when his time to die, according to the stars, arrived and he seemed in health, he starved himself to death. The same story was told, with equal truth, of Burton of "Anatomy of Melancholy" fame and others. Men were in his time beginning to doubt that the stars had any influence on our lives and many not only doubted but were sure the whole thing was a fallacy. Many others, especially among the rich and amateurly learned, were interested in it as a sort of parlor entertainment, just as many moderns go to spiritualistic meetings, or did until Christian Science took the place of Spiritualism, and others play with the Ouija board. I am entirely incompetent to discuss his writings on this subject, because after many vain endeavors I find myself entirely

unable to understand even the language astrologers use. I am sometimes even inclined to doubt if their words mean anything, at any rate, those of the modern astrologers, many of whose books (those not interested in the subject would be surprised at the extent of the present-day literature) are being issued today. There are probably as many people now congenitally fit to accept astrology and all the other pseudo-sciences, as there were in Cardan's day, and if the great teacher of the people, the newspaper press, should in its wisdom decide that astrology deserves to be headlined and encouraged, I have no doubt that it would soon occupy a large and important place in public opinion. There is as much latent capacity for belief at the present time as there ever was. In Cardan's time, or just before, it was a common belief that the stars ruled our destinies; today other beliefs just as untrue take its place. I do not intend to mention them, because I probably have several myself and I might hurt your feelings by speaking slightingly of beliefs you think to be axiomatic and vital. We all feel more than we think, and belief is stronger than knowledge.

Time will not permit me to describe or even name all Cardan's writings and I know of no better way to describe him as a writer than in the language of Henry Morley, to whom, by the way, I am much indebted for many facts in Cardan's life. Morley says, "On all the attractive and pseudo-sciences of his own day, on ghosts, dreams, portents, palmistry, signs in the heavens and wonders upon earth, Cardan reasoned with good faith, and displayed in their discussion a profundity that flattered and encouraged shallower believers. Then, too, he wrote upon these and all things not only more profoundly but more pleasantly than the great body of his neighbors. As a writer he was at once learned and amusing. His quick natural wit made him a brief narrator even when he was most garrulous; there was pith in what he wrote, and his works always sparkled more or less with those well-considered and well-pointed sayings in which learned and unlearned equally delight. . . . The readers of Cardan were sure to be amused with wit and eccentricity, at the same time they were impressed with the convic-

tion of his being the most learned man of his own time, for there was no other whose philosophy embraced so wide a range of subjects. In this respect, and in the charm of nimbleness and suppleness as a writer, his chief rival, Scaliger, was greatly his inferior."

By 1546 Cardan had attained to comfort in financial matters; indeed, his position was so secure that he refused an invitation of Pope Paul III to come to Rome, saying to some of his friends, "he is but a crumbling wall; shall I quit a certain for an insecure position?" and declined the request of the King of Denmark (Christian III) to attach himself as a physician to his majesty's court. In declining the second appointment, he said officially, the climate of Denmark was ill suited to his weak body, but really he regarded the Danes as a barbarous people, did not want to lose the intellectual companionship he had in Italy, and being a loyal son of the church, did not approve of the treatment catholicism was receiving from the Danes.

At this time Cardan came under the influence of Vesalius, the father of anatomy, who did so much to break the shackles fastened on the medical world by Galen centuries before. This intellectual slavery was not Galen's fault, but was the result partly of man's inherent worship of authority and much more largely of the church's disapprobation of human dissection. The consequence was, physicians, instead of studying the human body to learn anatomy, studied Galen's writings. Occasionally professors of anatomy deigned to dissect a dog; as a rule, when teachers used a human body to teach from, they had a menial to do the work while they sat in a high place and read to the students the commentaries of Galen, and when the structure of the body did not agree with the statements in the book, the comment was, "This body must have been wrongly made, because the book is right." Vesalius changed all this. He studied the dead human body. To get bodies he robbed graves, even gibbets. He underwent all kind of hardship, but he discovered much of the real structure of man. Though Cardan apparently never knew Vesalius personally, *i. e.*, never met him face to face, he corresponded with him,

learned much from him and was intellectually tremendously influenced by him.

It is curious that Paracelsus, who died in 1541, who made quite a great deal of noise in the world, who though he may have been a prince among charlatans yet had genius, if not entirely unknown to Cardan, certainly did not influence him in any way. They had one trait in common: both believed in studying people and nature rather than books. Paracelsus had one cry, "Away with authority. Let us go back to nature," *i. e.*, to the study of nature. This was the symbolism of the burning of the works of Galen and Avicenna at his first lecture in Basle. Cardan's intellectual viewpoint was the same.

The modern palmists may accept Cardan as a brother, for he wrote on metoposcopy—the reading of the lines on the forehead. Morley states that the plates, of which Cardan made many, were made public, and then only some of them, one hundred and eight years later in Paris. The forehead was mapped out, each region representing astrologically the moon, Mercury, Venus, the sun, Mars, Jupiter, Saturn. I have not time to relate the many things revealed by metoposcopy, but women may be interested to know that a straight line running horizontally across the forehead, just above the middle, means its owner will be fortunate in life and will always get the better of her husband, but the same line crooked means death by violence. A woman having a wart at the root of the nose is of necessity a monster who will commit the foulest crimes, but if she have a wart on her left cheek a little to the left of where a dimple ought to be the poor woman will sooner or later be poisoned by her husband. In other works he interpreted the lines on the knees, arms, etc.

In 1551 Cardan had attained such great repute that his services were wanted everywhere. He went to Paris in that year and there met Sylvius, who was trying to demonstrate that Galen knew more about anatomy than Vesalius and that if the latter's dissections did not agree with the former's statements it was because the anatomy of man had changed since Galen wrote. Soon after he extended his journey to Edinburgh

to examine and give directions concerning the case of Archbishop John Hamilton, for which service he was paid fourteen hundred gold crowns. Later the Archbishop was hanged. He went from Scotland to London, where he saw King Edward VI. The English court was anxious to get Cardan's astrological opinion about how long the king would live, what he would do and other matters of like sort. Cardan's horoscope promised a long life for the king and when Edward died soon after, he wrote a paper to prove that the error was not the fault of the stars, but the result of his own ignorance. His faith in astrology was not shaken in the least. He also wrote about the English, and things happening today make interesting his judgment on the people. He says, "The English care little or not at all for death. Cheerfully, without blenching, without tottering, they bear with constancy the final doom." The words are true today, not only of the English but of some others. I wonder, however, would a stranger passing judgment on America say the same thing of us, would he not say something very different or would he see deeper than ourselves and perceive a bravery of soul, a virility deep in the heart of the nation, hidden to many of us by a skin of triviality, an overlayer of luxury, a softness caused by absence of responsibility because the battle of life is too easy? Would he in truth find us "too proud to fight?"

Before this time he had written a series of books on "Subtility." In them he had discoursed on almost everything in the heavens above, the earth beneath, and the waters under the earth, real and unreal things, philosophy and domestic science, medicine and morality. One subject he omitted, as he did in all his writings. He never discussed politics, and unlike modern people, believed that it was not his affair but the business of the rulers to govern. He was either very cautious or very modest about political matters. He did not believe, as we pretend to believe even if we do not, that the good God has given every featherless biped who has reached the ripe age of twenty-one, especially if he be of the male sex, the ability to help decide how the people shall be governed. "Subtility"

brought forth some adverse criticism from Scaliger, followed by replies and counter assaults and re-replies. The quarrel ceased, but people still read "De Subtiltate Rerum" and many years after (1656) Cyrano Bergerac found inspiration for his "A Voyage to the Moon" in a story told by Cardan that one evening two tall men appeared to him and after much talk told him they were inhabitants of the moon and then disappeared.

He reached the acme of his fame in 1557. Then tragedy, the tragedy that brings shame and horror, not mere hardship, began to hover near him. At midnight, December 20th, as he lay awake the bed and room began to tremble as if from an earthquake. On the morrow he was informed his son Gianbatista had brought home Brandomi Seroni as his wife. A few nights later the trembling occurred again and this time he found his heart palpitating. He thought the trembling had both a natural and supernatural cause and that it portended evil. Evil was in truth hastening on its way. The girl was of the lowest. Cardan forbade the son his house, but after a few months behaved as fathers do in such circumstances. Meanwhile a child was born and Gianbatista found bitter reason to deplore his folly. He was dragged down as many weak, malleable, easy-going, pleasure-loving, duty-forgetting men have been before and will be till the end of time by an evil woman. She had long lost her character. Her brothers were ignorant foot soldiers, her father a ruined spendthrift and Gianbatista had married the whole family. He himself was not an admirable person and deserves little pity, but, as often happens, he, in destroying hinself, pulled down a man, his father, worthy in all ways of a peaceful, honorable old age. Fate ruled as always. The inevitable happened as is usual. Soon a second child was born. The mother was weak and sick, the conditions of her life had become unbearable to her, she lost control of herself and in anger, but with truth, she, cat-like, spat out at her husband that he was not the father of her children. Her mother, mixing in the quarrel, corroborated the daughter. Gianbatista did nothing, but a little later talked over matters with a youthful friend, bribed him to put poison, which he gave him, into a cake

which his wife, Brandomi, would eat. The cake was cooked and eaten by several persons, and Gianbatista's brother-in-law coming to the house soon after found father, mother and sister ill. Suspecting poison, he drew his sword and, lunging at Gianbatista and his brother, fell in a fit and so remained some hours. The wife died, the others recovered. At the moment, doctors, not knowing of the poison, certified she died of a fever, perhaps the result of pregnancy. Soon Gianbatista, his brother Aldo, and the famulus were arrested. Cardan was told. No longer did he think of science, of fame, of immortality, but became a father fighting for his son's life. The battle broke his pride but not, till later, his endurance. I can not give an account of the trial, but people who think that only in modern times have criminals tried to avoid justice may be interested to learn that the old Italian lawyers were just as acute and just as full of tricks and appeals to sentimentalism as any of today. On April 7, 1560, a red mark on Cardan's finger had reached the tip and shone like blood and fire. In the morning the mark was gone. Gianbatista had been executed. Browning, in rugged verse and style somewhat obscure, yet worth the studying for the thought within, could have extracted a world philosophy out of this squalid, common, vulgar crime; I can not, but I think we all must feel, though inarticulate, the horror of it.

Cardan persuaded himself that he was being persecuted by pretended friends and that his son, a victim of the law, had been unjustly punished. Many acquaintances did desert him, and worse than this, gossip, ever ready, ever on the alert, ever anxious to do injury, began to concern itself with him and vague accusations about his conduct toward some of his boy students became current. These accusations died down, but he was getting morbid, growing insane, and began to have delusions of persecution, believing even that there was a conspiracy to poison him. There was a little foundation for his suspicions. Cardan had always had professional enemies and they were glad to get a chance to injure him, not by actual conspiracy, not by material poison, but by that more virulent poison, scandal-

wagging tongues, but his insanity showed itself in that he confused his friends who were trying to aid him with the men who were trying to hurt him. As time passed troubles accumulated. He, for some ecclesiastical reason, was sent to jail by the church authorities and kept there quite a little time, afterward being permitted to be his own jailer, in his own house, but he was interdicted from teaching and writing. Flying, as always, to his pen for aid to give him relief, he wrote an autobiography and this was his last work. His period of grandeur was over and he passed his old age in Rome, a pensioner of the Pope, walking the streets with unsteady, awkward gait, dressed in strange garb, talking to himself, gesturing, glancing furtively around, looked at askance by passers-by and regarded by everyone as mad. He died September 20, 1576.

So much for the events of Cardan's life, the external things, the forces outside himself acting upon him. Let us for a moment look at the world of his time and see what the larger setting of his life was. No one needs to be reminded of the greatness of the sixteenth century, but I will bore you for a moment with a few dates. Columbus had opened a new world in 1492. Luther was born in 1483, Ambrose Pare in 1517, Ivan the Terrible in 1550, and Francis Bacon in 1561. The English College of Physicians was founded in 1519. The first European pharmacopoeia was published in Nuremberg in 1542. Harvey, unfortunately for Cardan, did not come into the world till 1578, though late in Cardan's life (1569) Caesalpinus published in Florence a theory of the circulation of the blood, but he was like the organic evolutionsits before Darwin: he had opinions, he did not experimentally discover facts. In 1519 Magellan sailed through the straits now bearing his name into the South Sea of Discovery and so to the Philippine Islands, where he died. Michael Servetus got himself burnt at the stake because he said in 1553 that the blood, in order to get from the right to the left side of the heart, might have to pass through the lungs. Modern worshippers of the monkey goddess, freedom of academic piffle, regard him as one of their patron saints, whereat I suspect he feels, if he knows what is

going on in this world, but little honored. The British Empire was all unconsciously, almost accidentally, being founded. Italy had not yet dreamed of being one kingdom. The modern German Empire was still unconceived. The catalogue of things done, things thought, would fill many pages, far more than I can give. Suffice it to say that as America today could, not altogether unjustly, be described as a country ruled by the tongue, so Europe of the sixteenth century was a world of thought and action. Cardan, like all men, was influenced by his age. He, like everyone, was the product of his environment, but what the product is, good, bad, indifferent, depends upon the inherent nature of the man, the quality of his protoplasm, and heredity alone controls that. Environment can not transmute base metal into gold nor make two brain cells grow where one grew before, though it may injure or destroy or generously nourish. Hard as Cardan's youth was, it seems to have been a good environment, judging by results.

To an alienist the first question always is, was Cardan insane? In his own time many so regarded him—friends as an inspired imbecile, enemies as just an imbecile. Few held the balance even while forming judgment. For years after his death men who wrote of him also regarded him as more or less insane, but they thought him insane because of the qualities which we of today regard as proof of sanity, and sane because of things we regard as proving insanity. So changes the world's point of view. The difficulty in settling the question is to find a test of sanity. If one accepts as proof of insanity the common man's idea, namely, belief in things he disbelieves, behaving as he does not behave, and having a point of view unlike his own, then Cardan was insane, because he believed in the stars, in dreams, in his familiar spirit, etc., behaved in a very idiosyncratic way, and his point of view on everything was certainly unlike the common man's. But any such yardstick as that means that all the world is crazy save our own immediate friends in our own little parish. The test of sanity is, are the man's thoughts and acts consonant with the racial and family heredity, his epoch, his education, his environment.

In other words, whether an act or thought is sane or insane depends upon latitude, longitude, race and time. The African negro who believes in ghosts is sane, the twentieth century American who does so is not, or rather was not, because many people seem to be reverting to primitive ideas. Socrates had a demon and was sane; many who so claim today are simply humbugs. Now following our rule, Cardan was not insane till old age. He held the common beliefs of his time, though it was an age of change and those beliefs were fading out. If one once realizes that man is not a reasoning but a feeling animal, who only reasons about things which have no personal effect on him and that he is mentally an imitative animal, we cease to be surprised to find men believing all sorts of impossible things and obeying the theologic dictum that faith is believing what you know can not be true. Cardan simply followed the crowd, being among the intellectual crowd rather than the other crowd and really a little ahead of most men of his time. He was a mixture of medievalism and new learning. He could not get rid of the influence of intellectual heredity entirely; no man can, but he did mold it somewhat.

How does Cardan rank as a physician? He was not a man of science, but an artist. It was in his time almost impossible to be a man of science in medicine, because the scientific spirit was just awakening. He had some of the spirit, but not so much as other men of his time. Being an artist, his work has been of no use to physicians living after him, because art is wholly personal and if taught at all can only be taught by personal contact. His skill was not in discovering scientific laws, but in empirically finding out what to do in any given case. He was great in empiricism, not in rationalism, which is true science. He played on the sick human machine as a great musical artist plays on his instrument, but he knew nothing of the great biological laws underlying medicine. He had not the prevision that Vesalius and some others of his time had concerning the development of the science of medicine. He knew only the art of his age which was increased by his personal skill.

THIS GENERATION AND THE NEXT IN RELATION TO MENTAL DEFECT

By Charles H. Frazier
Professor of Clinical Surgery

In gathering information to bring before you this afternoon, I have chosen to speak entirely about the feeble-minded, because although the condition of the insane is one of mental defect and is quite as serious and important a problem as the feeble-minded, yet it is better understood and more realized by the community in general, whereas the figures I will give you as a bald introduction to my remarks on the feeble-minded are, I fear, little known or realized. These will serve to give you some idea of the magnitude of the problem.

There are at least 20,000 feeble-minded in Pennsylvania: 3,400 in feeble-minded institutions; 3,000 more going in and out of almshouses, jails, orphanages and prisons; between 13,000 and 14,000 at large without any protection.

The state now spends on the feeble-minded about $800,000 annually in maintenance alone for about one-fifth of the number who should be cared for. The cost to the state of the feeble-minded in courts and prisons is probably $600,000 a year. The cost of the feeble-minded in schools is estimated to be at least $300,000. At least as much more is spent in almshouses, orphan asylums, and through private charity. If we allow the feeble-minded to increase at the rate they are now reproducing their kind, consider the cost to future generations.

Almost two millions wasted every year; what will this sum be in ten years?

I come before you this afternoon not in any sense as an expert, but as a citizen, one of you, equally with you responsible for the next generation.

I believe that the most important problem we have before us is that of the prevention of mental defect. As a surgeon espe-

cially interested in surgery of the brain and nervous system, years ago the question of operation for elipepsy of certain kinds was constantly brought before me, and gradually more and more children with mental defects, with or without epilepsy, were brought to my office with the pathetic plea, "Doctor, I am sure she will be all right if you would operate on her brain." The number of these tragic and perfectly hopeless cases, their tremendous preponderance over the few for which surgery could do anything, first brought the importance of the problem to my notice. Later I became consulting surgeon to the Training School for Feeble-Minded Children at Vineland, first with the hope of finding some cases which surgery could benefit, and later from a desire to help, if only to a very small extent, in the splendid work which that institution is doing, not only towards caring for their inmates in an intelligent and economic way, but towards arousing the public to the menace of feeble-mindedness.

I say "menace" advisedly. In the old days these poor people were called "naturals," "innocents," "God's Fools." Now we know that a large percentage of our criminals are mentally defective, variously estimated at from fifteen to forty per cent of our prison populations, not to speak of a large percentage of prostitutes, chronic inebriates, bearers of illegitimate children and disseminators of social disease.

First, let us review the history of public interest in the feeble-minded, take stock of the facts of feeble-mindedness as known to medical science, and *finally* review these facts in the light of their social and economic aspects.

Between the years 1839 and 1880 Seguin and others in France, Guggenbühl in Switzerland, Twining in England, Saegert in Germany, Lombroso in Italy, and in the United States Howe of Massachusetts, became interested in this problem. In all of these countries the movement began with educational experiments with children in the hope that, by special methods, by hypnotism, by motor as well as mental exercises, they could develop intelligence believed to be for some reason dormant. Experiments were carried out of a very elaborate and expensive kind. Dr. Howe, who was also very much interested in the

training for the blind and the deaf, and had succeeded with these defectives, was untiring in his efforts, and it was many years before he could bring himself to face the truth that "once feeble-minded, always feeble-minded," that feeble-mindedness is an essential lack in the individual which no training or teaching can supply.

Schools and institutions on a very small scale, but ably managed, sprang up all over, and to the devotion and intelligence of the men and women who labored untiringly in them is due much of the knowledge we now have. In all these schools the effort was made with children and through manual and sense training. At first the results obtained in developing manual dexterity led to hopes of further success, but one by one these pioneers began to realize that their hopes were vain in so far as concerned the eventual development of the defective into a useful and intelligent member of society.

Then there arose a second stage of inquiry, the object of which was an investigation into the causes of feeble-mindedness. Influenced by the Darwinian and Mendelian schools of thought about thirty or forty years ago, the first inquiries into the heredity and social history of the feeble-minded were made. This marks the beginning of the present day lines of thought and investigation.

Causes of Feeble-mindedness

Let us look now into the mental and physical condition of feeble-mindedness, its divisions and subdivisions according to mental and physical characteristics.

Perhaps one of the best known medical authorities is Tredgold, of England. He defines feeble-mindedness as "amentia," a lack of mind, as differentiated from "dementia," the perversion of mind, of the insane. The fundamental test of the possession or lack of mind and faculties is "the power of maintaining existence," as Tredgold says, in whatever state of life, under whatever social or economic conditions the individual may happen to be placed, and fundamentally, no matter how valuable may be the intellectual tests, now so widely used, this economic

test is the essential one. It is with these so-called "aments," these feeble-minded who fail to be able to earn a living and maintain their existence "with their fellows in their own social sphere" that we are concerned.

The causes of feeble-mindedness are twofold: *extrinsic* and *intrinsic*. That is to say, there are a small percentage of cases where feeble-mindedness can be definitely traced to birth accidents, to injuries, to meningitis, contagious fevers, etc.; these are in themselves extrinsic causes of feeble-mindedness and would not necessarily be handed on to the progeny of the individual. But even in those cases supposed to have resulted from infectious disease, in many instances upon closer investigation it has been found that a mental instability and lack of nervous vitality exist in the stock, what is called a "predisposition to neuronic imperfection." Here, while it may be true, as we are told over and over again by the parent, that the child was perfectly normal until it had scarlet fever, yet the scarlet fever often acts as the last straw on the camel's back rather than as the primal cause. Therefore, it is the rare and exceptional case only which we would venture to say did not have the power, nay, was not fated, to hand on its defect to future generations.

In a far larger percentage of feeble-mindedness, estimated by the authorities at from sixty to eighty per cent, the causes are intrinsic and inherited, the result of intrinsic and inherited defect. The origin of the inherited types of feeble-mindedness is in many instances alcohol, social disease, racial poisons, and there may be others, but because cause and effect are so constantly interrelated the relative importance of one or the other is not known.

Thus we see that heredity is the most essential factor in the incidence of feeble-mindedness and when we consider the future this fact cannot be too strongly emphasized.

There are various types of feeble-mindedness, physical types we may call them, such as the Mongolian and the Cretin. These have particularly marked physical characteristics, unpleasant all of them, and it is not necessary for us to go into the details.

It is only necessary to mention that, with the single exception of the Cretin, no medical treatment has been of any appreciable value. In the latter cases we have been able, by the administration of thyroid extract, if begun in time, to mitigate the degree of physical and mental defect. But it could hardly be called a cure even in these exceptional cases.

No authorities are yet able to state the exact relation of feeble-mindedness to epilepsy. Suffice it to say that as both occur frequently in the same defective family strains and as institutional life is essential to the best methods of caring for both, they may well be considered a part of the same problem.

One of the interesting facts about feeble-mindedness is that in examining the brains of hundreds and hundreds of cases, although many physical defects have been found, although many of the brains of the feeble-minded are much larger or much smaller than the normal, much more simple or complex in their convolutions, it has not been possible as yet to correlate the degree of intelligence, the temperament or mental type, with the degree of physical defect. We have the sullen, we have the kindly, we have the willing, we have the angry, we have the superficially attractive and intelligent and the lethargic, in any of whom may be found either one or the other of the various lesions of the brain.

I want to say a word about a method of controlling feeble-mindedness in future generations, namely, sterilization. While this operation is not in itself a dangerous one, and does not affect sex characteristics, the best thought of the medical world today and the experience of all communities, where the measure has been tried, has proven that sterilization is not a desirable solution of our problem. It has proven a failure not only because prevailing sentiment is antagonistic and the enforcement of the law surrounded with technical difficulties, but because the sterilized subject still remains a moral and physical menace to society. He spreads social disease alike to the innocent and guilty, and is at the mercy of the most vicious elements of our community. While theoretically, therefore, sterilization might

at first sight appear an eminently practical preventive measure, in its application the advantages seem to be outweighed by the disadvantages.

Classification

Preliminary to a discussion of the social and economic aspects of feeble-mindedness, let me briefly refer to the classification of these subjects according to their mental abilities. The classification is determined by a variety of tests which are different in different countries and in different institutions, and which include intellectual, motor, social, ethical and esthetic tests, each checking up the other in order to minimize any possible error. These tests are applicable to both adults and children, but with regard to the latter let me say that authorities no longer believe that any test of a child under twelve years is final unless that child has been under the observation of trained observers or in special classes, where every effort has been made for a reasonable time to return to its normal school grade. To this end the establishment of special classes in all our public schools is essential to our program.

The intellectual tests, of which the Binet-Simon is only one of a number, have been much misunderstood and are of course only valuable when applied by experts. Barr, Healy, Fernald, Witmer and many others have modified and elaborated the Binet-Simon tests and added others.

But after all, the social test is of greatest practical import. Of course with all these tests the difference between the innocent feeble-minded and the one who has been exposed to criminal and degenerating influences in the community must be very definitely borne in mind. These social tests relate *first* to the investigation of the past history of the individual, both family and personal, and *secondly* to his relation to other human beings.

The esthetic test is of value principally, not in determining whether an individual be feeble-minded, but in helping us, if he be feeble-minded, to find an avenue in his poor distorted mind for the expression of happiness, usefulness and the conse-

quent reaction for good these may have not only upon himself but upon those around him.

As an illustration of what I mean, let me tell you the story of a small boy who had been utilized as a tool by a gang of pickpockets in one of our large cities. His age was sixteen, but he was very small physically, and mentally graded at about eight and a half. When he was finally arrested for the third time and through the intelligence of the judge of the Juvenile Court committed to an institution for the feeble-minded, not a reform school, he had become so hardened in crime, so used to the life of the underworld, that it was found really difficult to make him happy and keep him from annoying and injuring the other children. At last his passion for music was discovered and it appeared that it was through this passion for music that he had been first led astray, the leaders of the gang bribing him to steal by saying, "You can hear some music if you do this; we will buy you a ticket and you can hear some music," and the poor, little feeble-minded boy hadn't the will to say no. He became a valuable addition to the institution band, and was so happy in this that he became entirely amenable to all other institution regulations and work, and his estimated earning capacity in manual labor was four dollars a week.

Defectives are classed as idiots from 1 to 4 years; imbeciles, 4 to 8 years, and morons, 8 to 12 years, according to their mental age; but the difference between a normal child of 11 years and a defective graded mentally 11 years is a difference in ability to live, to plan, to think and to carry out a purpose, those fundamental things which make or mar our usefulness to the world in which we live.

Illustrative Cases

I will first give you a glimpse of these various grades as they exist in the world around us, unprotected by state or institutional care, through a few case histories, and then give you the contrasting picture of these pathetic derelicts as they are when protected in institutions. Of the lowest grade, the idiot, little need be said. Dr. Barr and others give hundreds of revolting

histories. Of all physical types, they are helpless, degraded objects. In homes they lie around in dirty corners, kicked and maltreated; and when their care becomes too great a burden in many cases they are brought to institutions. Even these wretched creatures, however, may be used for immoral purposes, and are a menace from disease.

For a picture of the next grade, the imbecile, I will draw from a Pennsylvania survey. Take the family of one Danny A., whose family name occurs 190 times in the records of outdoor relief of the past ten years in the county in which he lives. Danny's fraternity has been notorious in one way or another. One deserted from the Union Army, and until his death was noted for violence, debauchery, frequent resisting of officers of the law, and breaking prison. His sons and daughter shared his character and reputation. A sister of Danny lived as the wife of her uncle. Her son has been a good-for-nothing all his life. He alternated between the almshouse and a vagrant existence with various women. When tired of responsibility he turned them adrift and gave the children into the charge of the county. Two of the latter, who are very defective, have been for years boarded at county expense. They have been placed in homes repeatedly, but always returned for incapacity and thieving propensities. A third is now at Glen Mills. Some years ago the father stole a young feeble-minded woman from the County Home, and after the birth of three children turned her over to his eldest son, with whom she now lives as his wife.

Another case is that of Sarah C., an imbecile whose mental age is about five years; she can neither read nor write nor manage her household. She comes from a family strain, which has shown incest and other forms of offense, but so far as known she has led a decent life in this respect. She married at twelve years a man who, though industrious, drank and had no idea of figures nor the value of his services. It is said that he often did a hard day's work for thirty cents. In common with their kind, they have moved about a great deal, but because of their evident wish to lead honest lives, neighbors have always loaded them with gifts of food and clothing. Since Mrs. C. could not prepare

a meal nor mend and adapt the garments given her, their children were nearly always destitute. Some were markedly defective, and all have grown up ignorant, disorderly, and willing to depend on others for support. The C.'s have had seven children, one whose later history is unknown, one who is dead, two who are alcoholic and defective, two who are immoral and defective, and one who is an imbecile, stubborn and intractable. Free and at large these beget of their kind.

Of the *Moron* grade, let me cite the case of Sam Sixty, who was committed to the Ohio Penitentiary for brutality on his daughter, a man with the mind of a nine-year-old child. He has been in court at various times for shooting to kill, non-support and perjury, but his offenses in the sex realm are perhaps his greatest crimes. He is charged with assault upon each of his daughters dating from their early childhood. Some of the testimony regarding his behavior is absolutely unprintable. Sam is said to have worked very little, and to have spent his money, and all he could get of his wife's and children's earnings, on drink and immoral women. His defective descendents number into the hundreds.

From a rural school in Pennsylvania the following stories of the higher grade defectives are taken:

(1) Girl. 16 years. 6th Grade. Father hard-working, quarrelsome, sexually loose, and from a very bad strain. Mother formerly a prostitute. Home conditions exceedingly vulgar and degrading. The girl was indifferent and did not advance in school. She was immoral, obscene, a source of corruption to the rest of the school.

(2) Boy. 14 years. 3d Grade. He did good work in the third grade, but apparently has no ability to advance further. He is rough, obscene, and a very bad influence.

(3) Girl. 14 years. 4th Grade. Family history on the paternal side very bad, paupers, criminals, sex offenders. Father in and out of the County Home, with no responsibility for children since the mother's death. Brother at Glen Mills for stealing. Another boarded out by the county. She has been on the county for years. Tried in fifteen homes, but always returned

for irresponsibility and other faults. Her school record was bad. She is slow, inert, dull, undersized, physically and mentally like a child of ten.

Healy tells of a man who first came to his notice as the brutal murderer of a perfectly harmless little old woman. This murder the man confessed, nay almost seemed proud of. His mentality was that of a moron. For years he and his numerous children had been mainly supported by the work of his wife, who bore with him in spite of the well-known fact that he drank, was diseased and was untrue to her. He was also an epileptic. He had occasional work. He was utterly indifferent and had been in prison several times, once when a boy, but was pardoned and returned to the community, the reason given by the judge "because he was an epileptic." Later it was discovered that he was also responsible for another horrible murder several years before, when he had put a dissolute woman with whom he was carousing on the railroad tracks. This poor wretch was finally hanged.

Of the imbeciles in institutions it may be said that such a man as Danny makes an excellent farmhand and can, under supervision, care for the cattle, pigs and chickens. His work will be worth, on the average $2.50 to $3.00 a week to the institution. Such as Sarah can scrub and do laundry work and dishwashing, under direction, and can help in the nursing under constant supervision. Her work will certainly be worth $2.00 per week on the average.

Such a moron as Sam, if taken as a child, and trained before corruption, could do constructive work under direction, at the head of a group of farmhands or as a carpenter. His money value to the institution would be upwards of $5.00 a week.

Such a high-grade defective as the first school-child mentioned above could be a comparatively competent maker of clothes, and would be most helpful in the care and instruction of children and idiots. She could probably pay for her own support in the institution, and perhaps contribute a little toward the institutional expense of the others.

Institutions

A word about the feeble-minded institutions. From Massachusetts, from Minnesota, from New Jersey, from our own Polk in Pennsylvania, and from many other places here and in Europe, we now have enough data and statistics to enable us to know the best type, namely, a large parent institution or training school with such facilities for expansion, that groups for industries, for farm activities, or for reclaiming waste land, may be established as colonies. For under supervision and with careful training adapted to their mentality, the feeble-minded are able to do "much work of the simpler kind," cooking, cleaning, sewing, weaving, carpentry, all farm work and care of animals. They are happier and better doing such work, and physically healthier and more tractable. They do not often run away, and we often find the women pathetically full of mother instinct which leads them to love to care for the children and the helpless idiots, and to enjoy feeding, tending, teaching and nursing them.

In estimating the cost of institutions, bear in mind that the hospital plant, necessary to treat the mental and physical ills, many of them contagious, is the most expensive part of the plant and the cost of the hospital plant and maintenance could be greatly reduced, if the children found feeble-minded in the schools were committed at once, instead of allowing them to become diseased and degraded in our slums. The value of the work of the feeble-minded and his docility depend also on how early he is trained and whether bad associates have corrupted his naturally innocent mind.

Those who teach and care for the feeble-minded of whatever age call them "children," "boys," "girls," and show a patience, nay, a tenderness very touching, and a testimony to the pathos and demonstrativeness, the longing for affection and innocent childlike qualities in these poor creatures.

Before I go on I will give you some idea of the incidence of feeble-mindedness and of its estimated increase in the future. At least two in every thousand of the population are found to be feeble-minded in every community where any study has been made. This is not evenly distributed, certain isolated sections

where degenerate strains predominate, having a much larger percentage, but on the whole, city slums and rural districts, mountains and valleys, south or north, east or west, the general average is about the same. On this basis we calculate that in Pennsylvania there are at least 20,000, and in Philadelphia at least 3,200. As a matter of fact there are probably many more. For we know, for instance, in Philadelphia that in our Public Schools we have fully 2,000, leaving thus only 1,200 among the adult population, whereas in 800,000 adults we should find at least 1,600 or 1,800.

The abnormal fecundity of the feeble-minded and mental defective has been proven over and over again in statistical studies in every country here and abroad. The Royal Commission in England estimates that it is at least double that of the normal. In a study of a section of Pennsylvania the average feeble-minded woman was found to have seven children, whereas the normal had two to three. In Scotland, in a certain geographical limit, a group of 1,000 feeble-minded women were found to have three times as many descendants as 1,000 normal women, of whom three-fifths were illegitimate. A factor in the inheritance of feeble-mindedness is the fact that there are normal carriers of mental defect; that is, if there be a defect in the strain a normal woman may yet have feeble-minded offspring. The taint is almost sure to appear, even skipping several generations.

In reviewing the economic phases of the problems, let us consider the relation of the feeble-minded to schools, the spread of disease by the feeble-minded, and above all, the criminality of the feeble-minded.

In the public schools with our normal children, both in the city and in the country, are large numbers of hopeless defectives. These children, if in the regular class-rooms, are a great handicap to the progress of the whole class; not only does the already overburdened teacher spend a disproportionate amount of time trying to keep them up to the others, but they are foolish, mischievous and cause disturbance. If we put the feeble-minded in special classes for observation and training the per capita cost is doubled. This special class instruction is legitimate and

necessary and protects the normal pupil, but only so if, after they are proven defective, they can be removed to institutions and not, as now, allowed to remain year after year in the schools at large cost, and then at sixteen, the most dangerous age, turned loose in the coummunity.

The cost of our schools in Philadelphia is annually $7,945,-542.58.

The cost per capita in the regular elementary schools is about $33.

The cost per capita in special classes is about $65. Thus annually about $90,000 is expended upon public school education for the feeble-minded in Philadelphia alone, which is largely wasted, unless institutions are at hand into which these children can be sent as soon as they are clearly proven to be defective, and before they have reached the dangerous period of their lives.

There are other reasons for the removal of the feeble-minded from classes of normal children. Partly because they are almost always from bad home surroundings, partly because they cannot follow ordinary hygienic directions or take ordinary precautions, they spread disease, and because as mental defectives they are naturally in many instances subject to bad habits and perverted tastes, in their weakness they are a prey to vice and the vicious-minded.

I have just referred to the spread of disease by the feeble-minded in connection with the school child, and need only add that what is true of the child is true in even greater measure of the adult. Above all, the dread plagues of tuberculosis and social disease are almost always, one or the other, present in a feeble-minded household and spread from it to all with whom they come in contact. This in itself is an uncalculated and enormous expense in money, in life, in efficiency, in morality.

Responsible for Criminals

And now we come to the question of criminality. Who are the criminals, we or they, we for leaving them at large unprotected, or they who yield to temptation because they have not

the mind to appreciate the results of the acts they commit nor the character to resist the will of others or the promptings of their senses.

Jane Addams tells of a mother who came to Hull House to see an imaginary Devil Baby supposed to be hid there, who said, "I didn't have a devil baby myself, but I bore a poor 'innocent,' who made me fight devils for twenty-three years." She told of her son's experiences from the time the other little boys had put him up to stealing, that they might hide in safety and leave him to be found with 'the goods' on him, until, grown into a huge man, he fell into the hands of professional burglars; he was evidently the stool-pigeon of the vicious and criminal until the very day he was locked into the State Penitentiary. "If people played with him a little, he went right off and did anything they told him to, and now he's been sent up for life. We call such innocents 'God's Fools' in the old country, but over here the Devil himself gets them. I've fought off bad men and boys from the poor lamb with my very fists; nobody ever came near the house except such like and the police officers who were always arresting him."

In the records of the Pennsylvania courts is the case of Maria F., a querulous, vindictive woman, whose husband failed to support her, with the result that she took refuge in the County Home, whenever hard pressed by want or in need for a shelter for the safe delivery of her children. Later three sons and the mother were tried for the brutal murder of the wife of one of the sons, and the two sons were found guilty and hanged for it. Of the other children, three daughters were immoral and two sons defective, all having families. Maria F.'s husband finally committed suicide by sitting on the rails in the way of a train and Maria is now married to her third husband.

Of the criminal defective remember above all two things. First, it is almost always the higher grade feeble-minded who becomes the criminal, and because he belongs to the higher grade, his defectiveness is not easily recognized except by the expert. If early trained in institutional life this class is the most useful, the most capable of earning a living under supervision.

In the second place, because he has no realization of the consequences of his acts the defective is the most willing tool in every kind of vice. I need not perhaps mention the well-known fact that a large percentage of our prostitutes, some say thirty-five, some seventy per cent, are feeble-minded.

We leave the feeble-minded at large until they do wrong, then we commit them to prison, and at great expense we keep them there earning little or nothing. Even under an enlightened prison administration, where there is work for the inmates, the mental defective is so unable to keep up to the normal subject, that he does not get on and is constantly in trouble. Then after he has served his sentence he comes back into the community, wiser in crime on account of his associations, but wiser and stronger in nothing else, and in a few weeks or a few months back he falls into the hands of the law with a repetition of the same expensive procedure. I know of the case of a woman who has served eleven jail sentences and between these has brought into the world seven defective illegitimate children. She is but one of many.

These are the statistics in Pennsylvania. Our courts have cost us annually at least $500,000. Our aggregate sum for prisons is $1,750,000. At least twenty-five per cent of our prison population are defective. The defectives are almost inevitably recidivists and therefore doubly expensive to the taxpayer.

Connected with every court, connected with every penal institution, there should be psychopathic clinics for the recognition and examination of the defective. Dr. Walter Cornell, working with our juvenile and municipal courts here in Philadelphia, has found hundreds of cases, but where are they? At Blockley, or in some temporary reform school, which will set them at large again after a few years or months, or at home on probation. And why? Because there is no room for them in our institutions, and we, the citizens of Pennsylvania, the mothers and fathers of the next generation, submit and raise not a finger to help or protect ourselves or our children in the future.

This is a case of which Dr. Healy, the well-known psychiatrist

of the Chicago Municipal Court tells. Clara Y. was a young Russian woman, twenty-one years old, who had been in this country about two years. During that time she had voluntarily sought aid of two charitable institutions, several neighbors, and four or five other individuals. Each of these people had procured for her positions of one kind or another very easily. She seemed intelligent, was always able to get a job, never able to hold it. She told plausible stories about herself, which, however, were found to be entirely different each time and never true. She was a sex delinquent although this she managed to conceal for some time. Coquettish, vivacious, she laughed a great deal. "But I am clever, believe me, I know French when I want to know it. I can speak Russian, German and French. All my family are smart. Lots of big doctors tell us we are smart, but we have head trouble. Read and write, sure I can. I am proud, too, I don't want to go to no hospitals. I'm proud. I want to be something. I faint lots of times when I do hard work like scrubbing. I love music and the theater. I have been to the opera lots of times." And it was perfectly true. She had been to the opera and the theater lots of times. She could almost invariably, by standing in the entrance, through some plausible story or other, get somebody to take her in. Her English was very remarkable when you considered the length of time that she had been in America and the fact that she had never had any actual lessons, and her German and French were found almost equally good. Her mentality when tested in any other way, that is, with numbers, construction, motor tests, association or memory was not above eight years. She could not make the simplest change without mistake, and had no moral sense whatsoever, but in language ability she ranked well above the average person of her social station. Three years later her mental condition is just the same.

The story points conclusively to two interesting points, *first*, the fact that it required an expert to recognize the basic condition of feeble-mindedness because of the superficial brightness which deceived a large number of people, social workers, employers, police and even the court several times; *secondly*, the

large amount of money, time and effort spent by these various people perfectly fruitlessly for M. until her true state was recognized.

Large amounts of money are squandered annually by organizations and individuals trying to rehabilitate the hopelessly mentally deficient, both individuals and families. On one family in Massachusetts, during a number of years it was estimated that over $6,000 was spent by twenty-four agencies, which had given everything from a pair of shoes to an education in music. A good lady was persuaded to educate one of the girls so that she might support herself by giving music lessons. This girl, proven later to be an immoral defective and musically gifted, had three illegitimate feeble-minded children.

The existence of these defectives with special gifts makes them especially dangerous as they go about unrecognized, like the Russian girl M., whose gift was language expression. There are cases of special motor gift, in which class are many clever thieves and pickpockets, and in one case, that of a well-known prize-fighter, it was not until after he had committed murder that his real mental state was recognized. The feeble-minded are often also very cunning, astute and adroit in avoiding suspicion! Then we have the group of defectives with a craving for fire which we must recognize and beware of. The famous Vineland case of the boy, who set fire to $200,000 worth of buildings in one week, is typical and another instance of the money penalty we pay for not segregating the defective. The poor boy was made both useful and happy as stoker to the institutional heat and light plant.

A word about the feeble-minded in almshouses. There are hundreds of them scattered all over the state, and they might seem out of harm's way, but unfortunately this is the reverse of the truth. They wander in and out at will, and the women, not once, but many times, return to bear and leave a defective baby. The great Catholic institution of St. Vincent's deals with hundreds of such, without the power of lifting a finger to prevent. One of the managers told me about the ninth child of one mother, all feeble-minded and all at the mercy of charity.

The state assumed its first responsibility by opening an institution at Polk for feeble-minded children in 1893, and in 1903 a second institution was opened at Spring City. In 1911 an act was passed making provision for a Village for Feeble-Minded Women at Laurelton. This was the first great step along the lines of prevention. How absurd it is to continue building homes for feeble-minded children and allow the prolific feeble-minded woman at large. That the next generation may be freer from this menace—and feeble-mindedness can in large measure be eradicated just as readily as can tuberculosis—the state must deal with the problem with greater liberality and foresight. For the immediate future the state should include in its program:

First—More adequate institutional care not only for children, but more particularly for women.

Second—The enactment of a Commitment Law so that the parent cannot remove a feeble-minded child from an institution because of a small wage-earning capacity, just at the age when he is most dangerous to the communtiy.

Third—In all courts and prisons the provisions for examinations by a trained physician.

Fourth—Provision for special classes in public schools for the study and differentiation of the backward child from the mental defective.

Fifth—Permanent mental hygiene clinics in all large communities, and traveling clinics in the rural districts.

Summary

Feeble-mindedness is an inherited and incurable condition. Once feeble-minded, always feeble-minded.

At a conservative estimate there are at least 2 : 1,000 in every community.

Owing to the fecundity of the feeble-minded woman the proportion will increase unless vigorous preventive measures be adopted and enforced.

At large in the community the feeble-minded are a population of paupers, alcoholics, prostitutes, incendiaries and crimi

The best preventive method, known to scientist and

mist, is segregation. The present cost of segregation is ... in comparison to what the cost of the feeble-minded will be to the community ten, twenty, thirty years hence.

By careful and intelligent administration, by the establishment of the industrial and farm colony, by the ... land, the feeble-minded may be made largely self-supporting.

The only protection for the next generation ...

CHANGES IN COLLEGE ENTRANCE REQUIREMENTS DURING THE LAST HUNDRED YEARS

By George G. Chambers

Assistant Professor of Mathematics, and Director of Admissions

There are now 596 institutions in the United States listed as universities, colleges and technological schools by the National Bureau of Education. One hundred years ago only thirty of these institutions were in existence.

Before considering the entrance requirements to these institutions existing a hundred years ago, it will throw light on the situation to review hastily the entrance requirements imposed during the previous one hundred and seventy-nine years; that is, since the founding of Harvard College.

The first set of regulations for the government of Harvard College was promulgated in 1642. These regulations were stated in Latin and included a paragraph concerning the requirements for admission. The following is a contemporaneous translation of that paragraph: "When any Schollar is able to read Tully or such like classical Latin Author ex tempore, and make and speake true Latin in verse and prose, suo (ut aiunt) Marte, and decline perfectly the paradigms of nounes and verbes in ye Greek tongue, then may hee bee admitted into ye College, nor shall any claime admission before such qualifications."

It is to be noticed that Latin and Greek were the only subjects required at that time. Until 1807 they were the only subjects required for admission to Harvard. Arithmetic was imposed as an admission requirement to Yale in 1745. Arithmetic and Geography were added to Harvard's requirements in 1807.

The trustees of the College, Academy, and Charitable School

of Philadelphia (afterwards the University of Pennsylvania) adopted the following action in April, 1756:

Agreed that a Scheme of liberal Education offered by the Faculty for the approbation of the Trustees be tried for the space of three years from this Date and that Mr. Smith (the first Provost of the University of Pennsylvania) publish the Same in Order to obtain the Sentiments of Persons of Learning and Experience concerning it.

That scheme provided for a Latin and Greek School (a part of the Academy), and a College with a three year course. The course in the Latin and Greek School was divided into four stages described as follows:

1st Stage. Grammar. Vocabulary. Sebtentiae Pueriles. Cordery, Æsop. Erasmus.

N. B. To be exact in declining and conjugating. To begin to write Exercises, for the better understanding of Syntax. Writing and Reading of English to be continued if necessary.

2nd Stage. Selectae e veteri Testamento. Selectae e profanis Authoribus. Eutropius. Nessos. Metamorphosis. Latin Exercises and Writing continued.

3rd Stage. Metamorphosis continued. Virgil with Prosody. Caesar's Comment. Sallust. Greek Grammar. Greek Testament. Elements of Geography and Chronology. Exercises in Writing continued.

4th Stage. Horace. Terence. Virgil reviewed. Livy. Lucian. Xenophon or Homer begun.

N. B. This Year to make Themes; write Letters; give Descriptions and Characters. To turn Latin into English, with great Regard to Punctuation and choice of Words. Some English and Latin Orations to be delivered, with proper Grace both of Elocution and Gesture. Arithmetic begun.

The description of these stages was followed in the original statement by the following comments:

Probably some youths will go thro' these Stages in three years, many will require four years, and many more may require five years, especially if they begin under nine or ten years of age. The masters must exercise their best discretion in this respect.

Those who can acquit themselves to satisfaction in the books laid down for the fourth stage, after public examination, are to proceed to the study of the sciences, and to be admitted into the College as Freshmen, with the privilege of being distinguished with an undergraduate's gown.

It thus appears that both Arithmetic and Geography were included with the Latin and Greek for admission to the college department of the University of Pennsylvania in 1756. No other subject was required by any American college until English grammar was added by Princeton in 1819.

I have been able to find no further information concerning the admission requirements to the College of the University of Pennsylvania until 1829, the date of the earliest existing catalog. That catalog gives the following requisites for entering the Freshmen Class:

> Every applicant shall have read Virgil, Sallust, and the Odes of Horace, in the Latin; the New Testament, Lucian's Dialogues, Xenophon's Cyropedia, and the Graeca Minora of Dalzel, in the Greek Language; and learned quantity and scanning in each. He shall also have been taught arithmetic, including fractions, and the extraction of roots; English grammar and the elements of modern Geography.

It should be noticed that the requirements at this time (1829) did not differ much from those adopted in 1756, and in the absence of evidence to the contrary, we should assume that throughout the period from 1756 to 1829 the requirements for admission to the University of Pennsylvania remained practically unchanged. In fact, the catalog announcements show that no change was made until 1846.

During the year 1845–1846, a committee of the faculty of the University of Pennsylvania revised the entrance requirements. Its report was as follows, and was approved by the trustees:

> The Committee appointed to examine whether any and if any what changes should be made in the requisites for admission into the Freshman Class, report the following as a substitute for the provisions of the existing statute.
>
> *Latin:* Caesar (1st Three Books of the Gallic War), Ovid (Excerpta) Virgil (1st Six Books of the Aeneid), Cicero (the four Orations against Catiline), Horace (1st Book of the Odes).
>
> *Greek:* Xenophon (Anabasis), Homer (1st Three Books of the Iliad).
>
> Quantity and Scanning in each language.
>
> Greek and Latin Exercises.
>
> Ancient and Modern Geography.

English Grammar.

Arithmetic.—Elementary Rules of Algebra, including Simple Equations.

The Committee recommend the adoption of the following resolution:

Resolved, That the plan of requisites for admission to the Freshman Class be communicated to the Board of Trustees for their adoption.

(Signed) HENRY REED,
HENRY VETHAKE,
GEO. ALLEN,
Committees.

Oct. 4, 1845.

Two changes should be noticed. First, there is a precise statement in the new requirements as to how much should be read in the different Latin and Greek authors; and, second, there is added the "Elementary Rules of Algebra, including Simple Equations." Algebra had been added by some other colleges a little earlier.

There was no further change in the entrance requirements to the Course in Arts at the University of Pennsylvania, except in minor details, until 1884, when English Literature and Plane Geometry were added. The following year ancient and United States history were added. Since that several sciences have been added, and also some other subjects of a more or less miscellaneous character. With these recent additions there was introduced the principle of election, so that no student was required to take all the subjects on the list of acceptable preparatory subjects.

Admission to all colleges before 1870 was exclusively by examination. At first only oral examinations were given. No trace of written examinations has been found until the middle of the nineteenth century. The examinations were conducted by the president of the college or university or by tutors. Boys were prepared for college either by private tutors or by grammar schools (Latin schools as they were often called). Connected with each colonial college there was usually a Latin school.

Later on there grew up alongside of the Latin schools a new class of institutions known as the academies. These arose to meet the demands for popular and useful studies. Before the beginning of the period in which we are especially interested

these academies became rather numerous. Their curricula comprised most of the subjects taught in the colleges and many others besides. Dr. Edwin C. Broome, in his thesis on College Admission Requirements, concludes, after examining several sources, that the average academic course comprised the following studies: "The three R's, English grammar, Latin, and Greek, geography, algebra, geometry, natural philosophy, astronomy, music, composition, oratory, bookkeeping, logic, and virtue."

It is to be noticed that these academies included Latin and Greek among their subjects and they gradually supplanted the grammar schools as preparatory schools for college.

The Academy of Philadelphia, which afterwards developed into the University of Pennsylvania, was the earliest of these academies. It was founded after the publication of a carefully worked set of proposals by Benjamin Franklin.

The following quotation from Franklin's proposals is very significant in view of the present-day development of popular education and especially in its attitude towards the classics:

> When Youth are told, that the Great Men whose Lives and Actions they read in History, spoke two of the best Languages that ever were, the most expressive, copious, beautiful, and that the finest Writings, the most correct Composition, the most perfect Productions of human wit and Wisdom, are in those Languages which have endured Ages, and will endure while there are Men; that no Translation can do them justice, or give the Pleasure found in Reading the Originals; that those Languages contain all Science; that one of them is become almost universal, being the Language of Learned Men in all Countries; that to understand them is a distinguishing ornament, etc., they may be thereby made desirous of learning those Languages, and their Industry sharpen'd in the Acquisition of them. All intended for Divinity should be taught the Latin and Greek; for Physick, the Latin, Greek and French; for Law, the Latin and French; Merchants, the French, German, and Spanish; and though all should not be compell'd to learn Latin, Greek, or the modern foreign Languages; yet none that have an ardent Desire to learn them should be refused; their English, Arithmetick, and other Studies absolutely necessary, being at the same Time not neglected.

When the Academy was started there was an English School and a Latin School, as coordinate departments of the Academy.

Later on when the scheme of the first provost was adopted, the Latin School so completely eclipsed the English School that it almost disappeared. That situation was a source of much concern by Franklin in his later years.

When higher education was first introduced into the colonies, Latin was the universal language for scholars in England and on the Continent. It was the only language permitted on the campus for ordinary conversation. Among the early statutes of Harvard the following regulation is found: "Scholars shall under no consideration use their mother tongue within the limitations of the college unless summoned to deliver in English an oration or some other public exercise." There was a similar rule at Yale. In this connection it should be noted that the original entrance requirements to Harvard required that the student seeking admission should be able not only to read, but also to "speak true Latin in verse and prose."

The statutes requiring Latin to be used in all intercourse on the campus gradually became a dead letter and about the time of the beginning of the Revolution it was stricken from the statutes. This change had a corresponding effect upon the admission requirements. As a consequence candidates for admission were required to be acquainted with the grammar of the Latin language, to be able to construe and parse the Latin authors, but were not required to speak the language.

During the early part of the nineteenth ecntury there was almost complete uniformity in the curriculum in the American colleges, and also uniformity in the entrance requirements. The aim of the college curriculum was primarily to produce an educated clergy. This was specifically stated in connection with the founding and early history of Harvard and Yale. The University of Pennsylvania, however, was founded to give a liberal education to the rising generation whether preparing for the ministry or not. Even the first provost's emphasis upon the classics was made with a belief that they would furnish the best foundation for a liberal education in any calling, and the success of the early graduates of Pennsylvania in various

lines did much to fix this view in the beliefs of the educational world.

The year 1870 fixes an epoch in the history of college admission. During the period 1817 to 1870 several tendencies were in operation influencing entrance requirements. During the early part of this period there was a gradual increase in the amount of Greek required, and there was also a tendency to make the requirements in both Greek and Latin specific and quantitative. For example, the colleges prescribed the exact number of orations of Cicero to be read, and the number of books of Virgil's Æneid.

By 1870 the amount of Latin and Greek required was practically identical with that now taught in a standard four-year high school course that includes both of these languages. As a rule, the students of that time began their language study at a much younger age than they do now. Also they did not study nearly so many other subjects as our high school students now study. The average age of college freshmen was about two years younger then than now.

Another gradual change during the period preceding 1870 was the introduction of other subjects. This was due first to the development of the academies to which I have referred, and the placing of additional subjects in their curricula. As a consequence some of these additional subjects came to be required for college admission. The real influence back of this change, however, was the desire to make education broader and more popular. The new subjects added to the list of entrance subjects between 1817 and 1870 were the following: English Grammar, Algebra, Geometry, Ancient History, Modern History, Physical Geography, and English Composition. I have mentioned these subjects in the order in which they were added. English composition was not introduced until 1870, whereas English grammar was required by Princeton as early as 1819. On the other hand, English literature was not added to the list of college entrance subjects by any college until 1874, when it first appeared in Harvard's requirements.

It should be noted, however, that no one college actually

required all of the subjects now listed, or at least they did not require them of every candidate for entrance.

Even though there was during this period a distinct tendency to broaden the list of college entrance subjects yet the list for 1870 seems very narrow compared with the lists published in the catalogs of most higher institutions at the present time.

Another tendency of the period previous to 1870 was manifested by the crowding down into the preparatory course several of the subjects which had formerly been in the college curriculum; for example, Advanced Arithmetic and Algebra, at first given in college, were put down into the preparatory course. A similar change has taken place in regard to History, the Sciences, and Modern Languages. The change in the case of these latter subjects, however, did not take place until after the middle of the nineteenth century, and modern languages did not find a place among the entrance requirements until 1875.

There were two other movements during the period preceding 1870 which have influenced very greatly the situation in regard to college entrance, first, the establishment of parallel courses in higher institutions, and, second, the establishment of the elective system. Both of these movements re-acted upon entrance requirements.

When parallel courses were established distinct sets of entrance requirements were established for admission to the respective courses, and when the privilege was given to college students to elect subjects in making up their work for their degree the practice of permitting entering students to elect subjects for admission naturally followed. By parallel courses, I mean scientific or literary courses differing in one way or another from the old classical course. Such a course was first announced by the University of Pennsylvania in its catalog of 1853. The degree of Bachelor of Science was awarded upon its completion. In the same catalog the following statement was added to the entrance requirements: "It is desirable that such students as design to pursue the scientific course, should also have studied the first three books of Legendre's Geometry."

Three years later that requirement was changed to four books, and in 1868 it was changed to six books. Later, other changes were made differentiating the entrance requirements to the scientific course in several respects from the entrance requirements to the old, or classical, course.

Very recently the scientific course in the University of Pennsylvania was abolished, coincident with the adoption of a number of changes in the course leading to the A.B. degree. The scientific course, just referred to, should not be confused with the technical courses now given in the Towne Scientific School of the University.

In 1870 admission to college was still entirely by examination. During the last twenty or twenty-five years preceding that date the examinations had gradually become written examinations. In that year, however, the first step was taken towards the introduction of the system of college admission by certificate. Dr. Henry S. Frieze, acting President of the University of Michigan, in his annual report for 1870 suggested the visitation and examination of the schools of the state of Michigan by members of the University faculty, and the admission of students to the University by certificate.

Before taking up the developments in regard to college admission since 1870 it might be well to consider briefly the question as to whether students entering college at that time were satisfactorily prepared. The public high schools had not then developed to any appreciable extent and the academies were still the chief means of preparing students for college, and, as stated before, the question as to their fitness to begin college work was determined by examinations given by the college. In 1873 President James McCosh, of Princeton University, presented a paper to the National Educational Association in which he severely arraigned the academies for so poorly preparing their students for college admission. We hear much at the present day in regard to the poorly prepared student entering college, and many college teachers are disposed to attribute that fact to the method of admission by certificate. There is abundant evidence, however, to show that college teachers

before the introduction of the certificate system pretty generally felt that their students were poorly prepared.

From 1870 to 1890 the certificate system became widespread. This was influenced largely by the establishment of state universities as part of the state public school system. It was, therefore, just as natural to transfer students from the high schools of that system into the state universities without examination on the part of the University as it was to transfer students from the elementary schools into the high schools, without examination on the part of the high schools. In fact, it was not much different from the transferring of students from one class to another in high school or college, as, for example, from the sophomore to the junior class.

Doubtless much of the adverse criticism of the certificate system is due to the fact that it was very laxly enforced in most instances. This again is a situation not peculiar to the certificate system.

There is much evidence to show that admission by examinations was very laxly enforced during the greater part of the nineteenth century. There has undoubtedly been a big improvement in recent years in the enforcement of admission requirements, both by examination and by certificate. At no time during the history of higher education in this country have the better institutions enforced their entrance requirements as strictly as they are now enforcing them. Until very recently few institutions pretended to live up to their announced requirements. All were expected to admit students with many entrance conditions, and all did so admit them.

Probably the most significant development in American education in the last half century has been the growth of the public high schools. Very largely the public high school has grown up to meet the demands for popular education. The high schools grew up side by side with the academies, and as a consequence there were two parallel educational systems, the private academy with which the colleges and universities articulated fairly well, and the high schools whose curricula did not closely articulate with that of the colleges and universities.

As time went on, the gap between the high school and the college became greater. The efforts to bridge over that gap have occupied much attention in the last twenty-five years, and with these efforts there has been not a little unpleasantness, sometimes on the part of the high school teachers, and sometimes on the part of the college teachers, each side claiming that the other should take steps to put up the bridge across the gap. Even now the problem is not entirely solved, but surely the gap has been bridged to a large extent, and the state of feeling on the part of the teachers in the two systems is much happier. A spirit of sincere cooperation is pervading all concerned. About a year ago the University of Pennsylvania specially announced an earnest desire to cooperate with secondary schools in transferring students to the University, and already the response on the part of the schools has been very gratifying.

The formation of organizations such as the Association of Colleges and Preparatory Schools of the Middle States and Maryland has done much to bring these people together, and to help them to see each other's point of view, the necessary first step in any effort to reach a mutual agreement. In addition to the Association just mentioned three other similar associations have been formed in other parts of the country; namely, the New England Association of Colleges and Preparatory Schools, the North Central Association of Colleges and Preparatory Schools, and the Association of Colleges and Preparatory Schools in the Southern States. In the territories covered by these associations the relations between colleges and high schools have gradually improved.

The contest is still going on as to the relative merits of admission to college by examination or by certificate. Attempts have been made in several instances to collect data bearing on this question, but no conclusive data have yet been obtained.

Probably the best statistics on this question are those compiled by the New England Certificate Board. The operations of that Board during the last twelve years furnish the best example of the strict enforcement of the certificate system,

enforced, however, purely from the college point of view, that is, without any element whatever of cooperation with the secondary schools of New England. These statistics show without question that those students entering by certificate into the New England colleges composing this board ranked just as well as those entering by examination. This board includes, with two exceptions, all of the good New England colleges except Harvard and Yale, whose systems of admission require examinations of all students. The most important conclusion from the work of the New England Board is that the secondary schools of New England are organized and equipped so as to be able to determine, with accurate judgment, whether or not any particular graduate is really ready to do college work.

Quite recently a sort of compromise between the certificate system and the examination system has been proposed and is now in practice in six or eight institutions in the East. According to this system each school desiring to present a candidate for admission presents to the college a record of the student's work. If that is sufficiently satisfactory the student then takes examinations in four subjects. Following these examinations a committee, after reviewing both the school record and the results of the examinations, determines whether or not to admit the student.

Another organization which has had a tremendous influence in connection with college admission is the College Entrance Examination Board. No other one organization has done as much to establish higher standards as this board has done. Not only has it established good standards for the few institutions which require examinations of all entering students, but its announcements of the scope of the work in the various high school subjects have been looked upon by schoolmen quite generally as setting good standards to be aimed at in the organization of any school.

Probably the most advanced theory on the subject of college admission treats the question as one phase of the general question of educational guidance. Educators interested in the general educational systems including all grades and kinds of

education from the elementary to the most advanced academic, professional or vocational education, are coming more and more to recognize that it should be one part of the function of a complete educational system to guide the individual student into a vocation in life for which he is suited.

That means that many high school students should be guided towards vocations which do not need a college education as an essential part of their preparation, while a small percentage of such students would be guided towards vocations which do need a college education as a prerequisite, if the student is to do his best work in that vocation.

A mere beginning has been made along this line. There is needed a more thorough analysis of the qualifications necessary for success in each of the several hundred different vocations and also there is needed more thorough and more reliable methods of analysis and forecast in regard to the qualifications of the individual students throughout the whole period of their formal education. There is a vast field of operation here for the educational psychologist. When this big problem is solved, the little problem of college admission will be solved incidentally as one phase of the whole.

THE QUEST OF HEALTH IN ANCIENT GREECE

By H. Lamar Crosby
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Wonders are many, yet naught more wonderful than man. He crosses the foaming deep, driven by the stormy southwind, the surging billows towering above him. Earth, eldest of the gods, immortal, unwearied, doth he wear, turning the soil with his wandering plough by the help of the horse from year to year. The light-hearted race of birds, the tribes of savage beasts, the sea-brood of the deep, he snares, he takes captive in the meshes of his woven toils, ingenious man. He masters by his arts the beast whose lair is in the wilds, who roams the hills; he tames the horse of shaggy mane, he puts the yoke upon its neck, he tames the tireless mountain bull. Speech and thought, swift as the wind, and all the moods befitting city life hath he taught himself; and how to flee the arrows of the frost or dashing rain that make life hateful beneath the open sky; yea, he hath resource for all; without resource he meeteth nothing that must come: escape from death alone shall he not gain; but from baffling maladies hath he devised escape.*

Such is the glorious song composed by Sophocles so many centuries ago in honor of man's struggle for mastery over nature. It can hardly have been mere chance that caused him to reserve for the end the conquest of disease, the crowning achievement of the human race. We of today should be slow to deny the justice of such a view. Disease and the measures taken to withstand its inroads surely never received such publicity as now. Never before have there been such determined efforts to enlighten society on the subjects of hygiene and sanitation, nor such enormous gifts of money for the furtherance of medical research. State legislatures contribute generously for the support of hospitals; and a recent number of that invaluable aid to knowledge, *The Ladies' Home Journal*, records that our beneficent government at Washington has issued a pamphlet on Health and Exercise. What fortunes have been founded upon Munyon's Remedies or Pink Pills

*Adapted from Jebb's translation.

for Pale People! And as one strolls down Chestnut Street he is forcibly reminded of the words of Herodotus concerning Egypt: "The practice of medicine with them is specialized. Each doctor treats a single ailment and no more, and everything is full of doctors." But what of ancient Greece? How far was Sophocles justified in his brave words?

Geographically speaking, the Greeks were a favored people. The climate was invigorating; mountain and sea were their constant neighbors; though possessing a few fertile valleys, the people had to toil to win their daily bread; and the islands that bridge the Aegean early tempted them to trade and adventure. Homer depicts a stage of civilization in which war, seafaring and agriculture were the chief pursuits; cities, in the common usage of the term, were non-existent, and even the nobles did not disdain to labor. In course of time, although these same pursuits never ceased to occupy the race, there began the inevitable drift cityward, wealth increased and labor became more and more the province of slaves and the very poor.

Yet the growing leisure class was not without the blessings of physical exertion. Military service was one of the prime duties of the citizen, and the training required was no less arduous than that of the soldier of today, productive of no less hardy a type of manhood. Hunting also furnished an opportunity for healthful exercise. But more important than all else may be reckoned athletics. Competitions in running and jumping, in boxing and wrestling, in hurling the discus and the javelin were in vogue from earliest times. The occasion might be the presence of some visitor at court or the funeral of a valiant warrior. In later days the great national meets at Olympia and elsewhere attracted contestants from the whole Greek world. The privilege of competing was the most cherished possession of the race, dearer even than the privilege of fighting, for during the progress of the games arms were laid aside. The victorious athlete, instead of a paltry medal or a loving cup to place upon the shelf and gather dust, was awarded the right to set up a statue at the scene of his triumph, instead

of a column on the sporting page and his likeness in the Sunday supplement, a Pindar or Bacchylides lent immortality to his name by their deathless song. But however great the enthusiasm over heroes of the track or field, it was long ere athletics yielded to the taint of professionalism and exercise became a vicarious pleasure. Physical training formed a large and important part of the school curriculum at Athens and Sparta, as no doubt generally in Greece. At Sparta even the girls participated in athletics, a fact that must to no small extent explain the sturdy bodies of the lads those Spartan mothers bore. Even when one's school days were ended it was the rule to exercise daily in palaestra or gymnasium. When the Greek gymnasium is named, one should not think of its modern representative, which, with all its merits, is after all an enclosed building, the atmosphere of which in most cases were better not described, but of an open exercise ground with shade trees and, if possible, a running stream. If buildings were added in later times, they were but accessories.

Indeed, one of the most striking facts in the life of the nation is that the men at least spent their waking moments in the open air. It should not be forgotten either that the Greeks were believers in the motto, "early to bed, early to rise". The first half of the motto unfortunately seems not to have been handed down to the Greeks of today, as any tired traveler whose hotel window looks upon the street can testify.

In the matter of dress, there was no bondage to Parisian modes. Healthful simplicity was the rule. Hats were inexpensive affairs, rarely worn except when on a journey. Styles seem not to have changed much from year to year, so that the thrifty housewife had no need to fear hostile criticism if she decided to make last Easter's bonnet serve a second time. There is nothing to suggest that the human form was tortured to produce a wasplike waist nor was my lady's gait made mincing by the limits of her gown. High heels were a monstrosity confined to people of the stage, and tight shoes, with all the attendant evils, must have been rare. As for male attire, there was no occasion for agitating coatless days in summer,

and no one need spoil his sunny temper over collars with a saw-toothed edge or an elusive collar button.

It may be that many of the blessings just enumerated were not the product of a conscious striving after health. Athletics must have appeared a real necessity of life, not an activity undertaken upon the advice of a physician, a reluctant concession to an expanding waist-line. The style of dress, so far as is known, was merely one expression of the good judgment and artistic taste for which Greek is synonymous. But at all events a people in whom the joy of living was so keen, the love of beauty so real, could hardly fail to rate good health high. If the Spartans refused to rear sickly infants, it was doubtless largely for the very practical reason that their existence depended upon the careful weeding out of all weaklings in the clan. More significant is the Greek compound noun in which health is joined to wealth as constituting together the *summum bonum*. Some old Greek poet gave utterance to a sensible thought when he said: "Health is to be ranked first, to be well born second, after that comes wealth." And yet the Greeks were not disrespectful to a well-lined purse. Plainer still are the words of Plato: "And yet what greater proof can there be of a bad and disgraceful state of education than this, that not only artisans and the meaner sort of people need the skill of first-rate physicians, but also those who profess to have had a liberal education? Is it not disgraceful and a great sign of the want of good breeding that a man should have to go abroad for his physic because he has none of his own at home? . . . and to require the help of medicine, not when a wound has to be cured or on occasion of an epidemic but just because by indolence and a habit of life such as we have been describing men fill themselves with waters and winds, as if their bodies were a marsh, compelling the ingenious sons of Asclepius to find more names for diseases, such as flatulence and catarrh; is not this too a disgrace?" A bit further on he speaks of the system of medicine then in vogue as one "which may be said to educate disease" and contrasts it with the saner attitude of earlier times when the valetudinarian,

who may be said to "enjoy poor health," received small encouragement.

Hippocrates, who flourished in his day, must have been a physician of no mean attainments, and the oath which he is said to have required of his students attests a high appreciation of the duties and responsibilities of the profession. If further testimony to the value of the medical practitioner of the day were desired, it might be found in the fact that, besides voting honors for help in time of epidemic, certain states were far-sighted enough to provide public physicians who drew their salary from state funds and charged no fee to the individual. There is the well-known case of Democedes, who, emigrating from his home in Magna Graecia, gained so much fame during his first year's residence in Aegina that he was retained by that state at a fee of a talent a year, a sum the value of which would be hardly less than fifteen thousand dollars today. At the expiration of his contract, Athens enticed him away by a substantial increase, and the year following Polycrates, tyrant of Samos, secured him at a still higher honorarium. There is no knowing how far the bidding might have gone, what heart-burnings the rivalry might have created, if an all-wise fate had not landed the celebrity as a prisoner in the Persian king's domain.

But what of those earlier times of which Plato speaks? It is well known how intimate was the relationship between the Greek and his gods. His religion may have lacked much of the spiritual element to be found in the Christian faith, yet Christians might profit by imitating the pagan Greek in admitting divinity to a closer partnership in the everyday affairs of existence instead of relegating worship to the brief and all too perfunctory observances of one day in seven. Thus the Greek endowed his gods with the power to heal. Zeus, "the father of gods and of men," among countless other titles, had that of Savior. So also Demeter, the goddess of the fruitful earth. Dionysus, the god of wine, is called physician. The prohibition movement would have met with little favor in those times. Athena, that most practical of deities, was worshipped as

Hygeia. But first and foremost among divine healers stood Apollo and his sister Artemis. It may be that there existed some vague notion of the homeopathic doctrine, "what will produce will cure," for these two deities had to a marked degree the power of bringing sudden and mysterious death. One recalls how in the opening of the Iliad Apollo sends the awful plague upon the Greek camp for injury done to his priest, and how, his anger at last appeased, the scourge is stayed.

But the gods did not maintain a selfish monopoly of the healing art. Apollo at least shared his knowledge with mankind. His first and most illustrious pupil was what might with reason be called a horse-doctor; but what right have we to criticize a god? Both god and pupil give the lie to the bold assertion that doctors have no ear for music. The kindly all-wise centaur set up the first medical school on record, and among its matriculates were Achilles, who should need no introduction, and Asclepius, of whom more later. The former imparted his knowledge in turn to his friend Patroclus, and two sons of Asclepius, physicians by inheritance, were with the Greek host at Troy. There seem also to have been in that army other healers whose names are not recorded. Homer rates the physician as the equal of many ordinary men, but so far as concerns the Iliad, their function is restricted chiefly to the cutting out of arrows and spearheads and the dressing of wounds, a form of "first aid" not beyond the ability of other heroes as well. It is plain that their presence in the army was not primarily as an ambulance corps but as fighters.

In those days men and women met on a plane of greater equality than became the fashion later on. We are therefore not surprised to learn that members of the weaker sex also possessed some knowledge of the use of drugs. Thus Helen added to the other social graces that made her irresistible the ability to brew a drink that made men forget all their troubles. Unfortunately not all her sisters applied their wisdom to such laudable ends. Medea used her medical accomplishments first to betray her own father and later to wreak vengeance upon her faithless husband; and that shameless social light

named Circe, having heard no doubt that the way to a man's heart is through his stomach, provided tempting viands for her gentleman visitors, but placed therein that which turned them into swine—truly an awful warning for the voluptuary.

It may be that if we could hear the account that these ladies themselves would give, it might prove that they had been grossly maligned. What more plausible than that, as often happens, superior intelligence had engendered mistrust among envious and less gifted neighbors? It would not be a unique instance of the confusion of learning with sorcery. It may be worth noting that of the many words in Greek associated with pharmaca, medicines, most are either uniformly or usually of bad significance. The concrete evidence of these words would seem to attest a persistent attitude of mistrust on the part of many of the people toward those who dealt in medicines. In view of this, it may not be out of place to record some scandalous jests perpetrated at the expense of Greek practitioners. We are told that "Marcus the doctor called yesterday upon the marble Zeus; though marble and though Zeus, the funeral is today." "Diophantus, having seen Hermogenes the physician in his sleep, never awoke again, even though he wore an amulet." And this from a malicious schoolmaster: "A doctor sent me his son to instruct in literature. But when the lad had learned his 'sing of the wrath' and 'numberless woes he gave' and the third line that follows, 'many a mighty soul he hurled into Hades,' he no longer sent the boy to school, but seeing me one day he said, 'I'm much obliged to you, my friend, but my son can learn that line at home; no need of sending him to school for that.'"

We are therefore not surprised to learn that the legitimate practice of the healing art had a powerful rival in ancient Greece. Not only had the practice of medicine started with the gods: at a time when Hippocrates and other medical men were actively engaged at their profession, a great many people still preferred to look to the gods for healing, either because of a spirit of conservatism that mistrusted new-fangled practices and human agents, or because the gods were more reason-

able in their charges, or because human efforts had proved a failure. Thus about the middle of the fifth century B. C. an offering of more than fifteen statues was dedicated at Olympia with the accompanying inscription: "Micythus of Rhegium and Messene dedicated these images to all gods and goddesses. His son being sick of a wasting illness, and having spent all the money he could upon physicians, he (Micythus) came to Olympia, and having made a vow, dedicated (this offering)." A sufferer of unknown name has left a testimonial still more interesting: "Despairing of aid by human arts, and resting all my hope on divine deliverance, I came to thy sacred grove, Asclepius, and in three months was healed of the injury to my head that I had borne a year."

It has been well said that "If one of us were transported to Periclean Athens, he would find life and manners strangely like our own, strangely modern, as he might term it." That modernity of the Greeks is one of the pleasant surprises that meets the student on every hand. He feels at home with the Greeks to an extent that is scarcely possible in the case of any other ancient people. Their problems are all too often still unsolved, their hopes and fears and very human foibles surprisingly like our own. After the lapse of twenty-four centuries, in an age gone mad over science there are those who view vaccination with suspicion and employ a horse chestnut or an iron ring as a cure for rheumatism, and unnumbered thousands are substituting prayer for medicine or surgery.

We have already had occasion to allude to Asclepius. In Homer's poem he is called simply a "blameless physician," and we are told that he had had the advantage of studying under Chiron, the centaur. Later ages so embroidered the tale that at last he became not merely the physician par excellence, endowed with more than human skill, the founder of a clan of healers, but a very god. The most familiar version of his career narrates that he was sprung from the union of Apollo and a mortal mother. Upon the death of the latter, Apollo intrusted his infant son to the keeping of Chiron, whose instruction proved so successful that upon one occasion Asclepius

even restored a corpse to life. For this presumptuous deed he was slain by the thunderbolt of Zeus, who later out of compassion placed him among the gods. A still more thrilling variation of the tale is this. "In the land of Epidaurus she (the mother of Asclepius) was delivered of a male child, whom she exposed upon the mountain which is named Titthium in our day. . . . But one of the goats that browsed on the mountain gave suck to the forsaken babe; and a dog, the guardian of the flock, watched over it. Now when Aresthanas, for that was the name of the goatherd, perceived that the number of the goats was not complete, and that the dog too kept away from the flock, he went up and down, they say, looking everywhere. At last he found the babe and was fain to take it up in his arms. But as he drew near he saw a bright light shining from the child. So he turned away, 'For surely,' thought he, 'the hand of god is in this,' as indeed it was. And soon the fame of the child went abroad over every land and sea, how that he had all power to heal the sick and that he raised the dead." The concluding statement, at any rate, is literally true, for we hear of no fewer than two hundred and seven centers of his worship scattered throughout all the region of the Mediterranean and Black seas.

But no shrine equaled in renown and influence that of Epidaurus. This was the parent of many branch establishments, notably those at Athens, Cos, Pergamum and Rome. The reason for this pre-eminence will probably remain a mystery for all who are not content with the local legend that here Asclepius was born. An ancient trade route connecting the plain of Argos with the seaport of Epidaurus led past the sacred valley; but Epidaurus never enjoyed such trade as Corinth and other cities of greater splendor and more central location. If the prior existence of the worship of Apollo at that spot is urged as the explanation of its choice by Apollo's son, why should not the more glorious seat at Delphi, the midpoint of the earth, have been preferred? Nor is it easy to find in the natural surroundings anything to suggest especial fitness as a health resort. If there were once springs, they could hardly

have been remarkable. There is no running stream of any consequence. In summer the heat is intense and in winter there are cold winds and snow. The most prominent feature of the landscape is Mt. Arachnaeum, a most austere and forbidding height, famed chiefly as the outpost whence, so many years ago, the capture of Troy was heralded to Agamemnon's impatient queen.

The road from the port of Epidaurus to the shrine is for much of its distance little more than a mule track, which clings to the precipitous sides of a ravine that divides Arachnaeum, and descends at times to the bed of the pretty brook, when the going becomes too difficult, to toil painfully up the other slope. This was the favorite approach in ancient days, for land travel was deservedly unpopular, and the road from Nauplia and Argos, though easier, was much longer and uninspiring. Conditions now are somewhat different. Pilgrims to the shrine, no longer mainly Greeks, are loath to trust the only boats that touch at Epidaurus, and Greek mules and saddles, though eminently safe, are not the most comfortable means of locomotion; whereas Nauplia, itself a most charming spot with clean and comfortable hotels, is easily reached by rail, and from there an excellent carriage road leads to the sanctuary. These advantages more than counterbalance the picturesque beauty of the shorter road and the dramatic suddenness with which, as one emerges from the rugged gorge, the whole panorama of the valley stands revealed.

The equipment required by Asclepius for the practice of his art was fairly modest. His sanatarium at Athens furnishes a good illustration. Admirably situated beneath the southern brow of the holy hill, shielded from the northern blasts and basking in the radiant warmth of the never-failing southern sun, the plant itself seems not to have differed greatly from that required in the worship of many another god. It included, besides the temple and altar, only a well, a portico and a building that may have served as the domicile of the official family. The Epidaurian establishment, as befitted the chief sanatarium of the land, was much more elaborate.

A theater, the most beautiful ever built and the best preserved of the remains at this site, nestles in the side of a hill that helps to form the southern boundary of the valley. One is surprised to learn that its seating capacity was nearly equal to that of the great state theater at Athens, for Athens was not only the greatest and most populous city of the Greeks but also the Mecca for travelers of every description, whereas the hieron of Asclepius had no fixed population save its corps of officials and was not even near a large city. The theater, therefore, is a mute but eloquent witness to the wealth that poured into the holy treasury and to the hosts of pilgrims that congregated there. Now only the blood-red poppies growing amid the seats remain to applaud the ghostly choir of some long forgotten play, or the mournful, introspective goat that I found in a summer house near by, perhaps the lineal descendant of the one that suckled the infant god so long ago. It is plain that Asclepius was a believer in the efficacy of intellectual enjoyment as an aid to health, but it is very doubtful if the plays were chosen with reference to the supposed needs of the "tired business man." In the absence of records to the contrary, we may suppose that here, just as at Athens, along with the spice of comedy or satyr play there was a plentiful admixture of lofty, soul-harrowing tragedy, what would doubtless now be labeled "high-brow stuff" and shunned with loathing. The Greeks, contrary to a common misconception, were after all a highly practical people and subjected even their poetry to the query, "Does it make man better?" For this and other reasons, it is probably not mere chance that placed the Athenian shrine of healing next door to the theater: a passage led directly from the former to the center of the "house."

This is not the place to attempt a description of all the features of the Epidaurian shrine, even were that possible. A glimpse at the plan of the ruins as they stand today reveals something of the complexity of its equipment; but much of what once existed has utterly disappeared—the sacred grove with its host of statues and statuettes, the lesser altars, the

memorial tablets and the models of diseased members that had been healed, and no few buildings—and what remains is so leveled to the ground that the purpose of some structures must remain in doubt. It will be advisable, therefore, to mention chiefly such features as have been identified and are significant.

Proceeding northwestward from the theater, one ascends a stone ramp which leads through what must have been an imposing portal. Nearby on the right is a large square building with a hundred and eighty rooms and equipped with baths, serving perhaps as an hotel, although it is manifest that the great majority of the visitors, here as well as at Olympia and other meeting places of the Greeks, must have provided their own bed and board. Farther on stood a temple to Artemis. We are surprised to learn that such was the generosity of the god that he made room also for a shrine of Aphrodite. One who recalls the past record of that goddess would expect from her anything but a healing influence. Somewhere outside the holy precinct a practical minded Roman caused to be built a house to serve the twofold purpose of a lying-in hospital and a refuge for sufferers past hope, for it was ordained that neither birth nor death should occur within the sacred bounds.

Not far to the left of the temple of Artemis was a stadium and near that a gymnasium. In the neighborhood are the remains of a large building that may have been a palaestra. It is clear that ample provision was made for physical as well as intellectual entertainment and exercise. Perhaps it was thought that the sight of athletic contests and gymnastics might stimulate the seekers after health to activity in their behalf. Unfortunately it does not often work that way with us—the bleacher habit rarely leads to anything more strenuous.

Extremely interesting, and most perplexing, is the beautiful circular tholos near the temple of Asclepius, the work of the same Polyclitus that built the theater. Only the foundations now remain in place, but enough of the superstructure has been found to indicate in some degree the charming design and superb workmanship that caused Pausanias, the ancient Baedeker, to mark it with a double star. We are exasperated

with him for neglecting to add a statement of its purpose. But his sin of omission has made it possible for modern scholars to exercise their ingenuity, and in consequence it has been variously explained as a place of sacrifice, a "pump room," and but recently as a music hall. Amid such divergent theories, the mere layman may take his pick.

But the real needs of the establishment, as at Athens, were served primarily by two buildings, the temple and the portico adjoining. In the former was to be seen the gold and ivory image of the god seated on a throne, one hand grasping his staff, the other held above the head of a serpent. It must not be inferred that the snake marked him as a Greek St. Patrick or served as the token of a Keeley Institute. If inebriety were ever viewed by the Greeks as a disease, it was at least held to be a gentlemanly ailment, and there is no record of any effort made to cure it. The snake was rather the helper of the god, chosen no doubt because of a belief in its superior wisdom, a belief that dates back to our first parents. Besides the cult statue there must have been also the usual temple furniture and a wealth of votive offerings. The temple itself is now level with the ground, but architectural and sculptural remains indicate in a measure its ancient glory.

The portico, that earliest and most pretentious example of a sleeping porch, was structurally independent of the temple, though open on the side that faced in that direction. In this immense ward the sick were placed to await the coming of the god. Modern notions of hospital management would doubtless be outraged by conditions there. There were no isolation wards, but all alike, both male and female, lay about in the same room on pallets provided by themselves or by their friends. At the height of the season, at such times as brought together sufficient people to fill the theater, the place must have been crowded. Yet it should be noted that the votive objects and memorial inscriptions, of which a great number is known to us either from lists or at first hand, would indicate that the majority of patients treated were not afflicted with communicable disorders. Of every fifteen, six had eye trouble,

two some ailment involving a leg, one had earache, one a diseased hand. Among the objects dedicated by grateful patients were to be found also representations of heads, feet, fingers, knees, a jawbone, and teeth. We learn that one man dedicated a heart. A member of the fair sex, perhaps because the bestowal of her heart had become a habit or for some tender reason into which we have no need to pry, presented two. In fact, every part of the human anatomy is represented in the list. One damsel, whose feeling of gratitude caused her to reveal what most of her sisters try to disguise, in the inscription commemorating her cure caused to be drawn about the name of her malady a line to indicate the great size of her foot before she took the cure.

We are fortunate in possessing an early and full account of the modus operandi of Asclepius in the Plutus of Aristophanes, a comedy of the year 388 B. C. The plot is concerned with the healing of Plutus, the blind god of wealth. There may be those among us who would think lightly of the skill of the divine healer because his cure seems not to have been made permanent. But let us hear the poet's story. The speakers are a slave who was an eye witness to the cure and his prosaic mistress.

CAR. Soon as we reached the temple of the God
Bringing the man, most miserable then,
But who so happy, who so prosperous now?
Without delay we took him to the sea
And bathed him there. WIFE. O what a happy man,
The poor old fellow bathed in the cold sea!
CAR. Then to the precincts of the God we went.
There on the altar honey-cakes and bakemeats
Were offered, food for the Hephaestian flame.
There laid we Plutus, as custom bids, and we
Each for himself stitched up a pallet near.
WIFE. Were there no others waiting to be healed?
CAR. Neocleides was, for one; the purblind man,
Who in his thefts outshoots the keenest-eyed,
And many others, sick with every form
Of ailment. Soon the Temple servitor
Put out the lights, and made us fall asleep,

Nor stir, nor speak, whatever noise we heard.
So down we lay in orderly repose.
But I could catch no slumber, not one wink,
Struck by a nice tureen of broth which stood
A little distance from an old wife's head,
Whereto I marvellously longed to creep.
Then, glancing upwards, I beheld the priest
Whipping the cheese-cakes and the figs from off
The holy table; thence he coasted round
To every altar, spying what was left.
And everything he found he consecrated
Into a sort of sack; so I, concluding
This was the right and proper thing to do,
Arose at once to tackle that tureen.

WIFE. Did not the God approach you? CAR. Not till later.
Then, alarmed, I muffled up my head,
Whilst he went round, with calm and quiet tread,
To every patient, scanning each disease.
Then by his side a servant placed a stone
Pestle and mortar; and a medicine chest.

WIFE. How saw you this, you villain, when your head,
You said just now, was muffled? CAR. Through my cloke.
Full many a peep-hole has that cloke, I trow.
Well, first he set himself to mix a plaster
For Neocleides, throwing in three cloves
Of Tenian garlic; and with these he mingled
Verjuice and squills; and brayed them up together.
Then drenched the mass with Sphettian vinegar,
And turning up the eyelids of the man
Plastered their inner sides, to make the smart
More painful. Up he sprang with yells and roars
In act to flee; then laughed the God, and said,
"Nay, sit thou there, beplastered; I'll restrain thee,
Thou reckless swearer, from the Assembly now."

WIFE. O what a clever, patriotic God!

CAR. Then, after this, he sat him down by Plutus,
And first he felt the patient's head, and next
Taking a linen napkin, clean and white,
Wiped both his lids and all around them dry.
Then Panacea, with a scarlet cloth
Covered his face and head; then the God clucked,
And out there issued from the holy shrine
Two great enormous serpents. WIFE. O good Heavens!

CAR. And underneath the scarlet cloth they crept

> And licked his eyeballs, as it seemed to me;
> And, mistress dear, before you could have drunk
> Of wine ten goblets, Plutus arose and saw.
> O then for joy I clapped my hands together
> And woke my master, and, hey presto! both
> The God and serpents vanished in the shrine.*

This narrative, however burlesque, undoubtedly reveals the salient features of medical practice at a typical Asclepieium of the early fourth century. First comes the bath. Modern Greek custom might lead one to suspect that there was more of hygiene than of ritual in that ceremony. But in ancient times certainly the better classes at least had no fear of water, externally applied. The comic poet inveighed against the hot bath as enervating, as it doubtless is, but the bath itself was a regular feature of the daily life. Secondly an offering was laid upon the altar. Then came the culminating act of incubation. With what holy awe, in what a fever of expectancy must the sufferer have looked for the coming of the god! It would be strange if there were not many who, like the slave of the comedy, but with better warrant, found sleep a reluctant visitor. It is worth observing that although the god and his daughter Panacea in person wrought the cure, the means employed were not altogether mystic or miraculous. Mortar and pestle and medicine chest are in evidence, and in the cure of Plutus, although the snakes were called upon to give the finishing touches, the god had first diagnosed the case and with a clean towel wiped the patient's eyes. This may well have been a realistic touch. Without imputing to the temple staff any unusual knowledge of medicine or surgery, it is quite reasonable to suppose that they recognized the value of simple, rational practices, while not disdaining to employ the assistance of the miraculous. It is significant that medical men, far from viewing them as quacks and mountebanks, went so far as to pay their respects annually to the god.

In dealing with the Epidaurian shrine, Pausanias includes among his notes the following interesting entry: "Tablets

* From the translation of B. B. Rogers.

stood within the enclosure. There used to be more of them: in my time six were left. On these tablets are engraved the names of men and women who have been healed by Asclepius, together with the disease from which each suffered, and the manner of the cure." One of the happy surprises that rewarded the labors of the excavators was the discovery of considerable fragments of these ancient tablets. They read not unlike testimonials to the efficacy of some patent medicine. "A woman named Cleo was with child five years. She came and slept in the abaton of the sanctuary; and in the morning, as soon as she had quitted the sanctuary, she was delivered of a son, who immediately washed in the cistern and walked about with his mother." Here is the case of a doubting Thomas, one of several testimonials calculated to discourage scepticism and confirm the faith of true believers. "A man, whose fingers were all paralyzed but one, came to the god as suppliant. But when he saw the tablets in the sanctuary with the miraculous cures recorded on them, he was incredulous and scoffed at the cures. However, he fell asleep in the abaton and dreamed a dream. He thought he was playing dice in the temple and that as he was about to make a throw the god seized his hand and straightened out his fingers. The god then asked him if he would any longer disbelieve the records, and he answered no. When morning came, he went out healed." Scepticism was not exclusively a masculine evil. We read of a woman afflicted with that taint. But curiosity proved stronger than scepticism. Like many another, no doubt, she argued that it would do no harm to try. So she lay down to sleep in the abaton. In due time the god appeared and promised to restore the sight of her blind eye, but ordered her to dedicate a silver pig in memory of her unbelief. Then making an incision in the defective member he poured in a drug. When day came, she went forth cured. Asclepius seems to have been remarkably magnanimous. His benign visage might well inspire hope and confidence. There was a certain "peeping Tom" named Aeschines who, when the suppliants had gone to sleep, climbed a tree and looked over into the abaton. Falling from the tree,

he struck some stakes and became blind. In his distress he besought the god, fell asleep, and was healed. Asclepius was not above compounding a hair tonic on occasion. "Heraeus of Mitylene (like the 'old nigger' of the well-known song) had no hair on the top of his head but a luxurious growth upon his chin. Ashamed of being laughed at, he went to sleep in the abaton. The god then anointed his head with a drug and made the hair to grow." Would that the lucky patient had inquired and transmitted to posterity the composition of the remedy!

The above cases, and they are only a few of the many that might be cited, presuppose merely one night's lodging within the sacred precinct. This may well have been the usual practice at first; but there came a time when, either because faith was on the wane or because the science of medicine had made such strides as no longer to be ignored, treatment took longer and the element of the supernatural, while not wholly absent, retired more and more into the background and our Asclepieium developed into a thorough-going sanatarium. A certain Marcus Julius Apelles, whose good intentions were better than his literary knowledge of Greek, has left a record of great interest in spite of its obscurity. Some extracts from the less difficult parts of his chronicle will suffice. "I, Marcus Julius Apelles, was sent for by the god, having had frequent attacks of indigestion. On my voyage, while at Aegina (one of the branch establishments of Asclepius), he bade me refrain from excessive anger. At the hieron (of Epidaurus) he bade me cover up my head for two days, during which there was no rain (seemingly a bit of pious fraud to impress the suppliant); eat cheese and bread, parsley and lettuce (this has a scientific sound); give myself a bath (it is charitable to suppose that the god had in view merely the patient's active participation in the exercise involved); swing in the second story promenade; rub myself with sand; walk about barefoot before entering the bath; and pay the bathman (the god had an eye to business). Apelles adds later that he was to rub himself with salt and mustard and makes the interesting observation that it smarted, but not when he bathed. Upon the successful completion of

his course of treatment, which occupied some days, he was requested to draw up an account of his case, provided he felt grateful. We infer that he was satisfied.

In course of time, when after nearly five centuries of conflict with the Christian faith, the forces of paganism were routed by imperial decree, Asclepius, stubbornest pagan of them all, made way for the Great Physician, the healer of men's souls, and the shrine at Epidaurus fell into decay. But even today the little isle of Tenos, whence came the garlic employed so successfully in the treatment of the rascally Neocleides, is the scene of two annual pilgrimages of Greeks in quest of health. The shrine is that of the Virgin, but all else is as in days of old: the same fountain, the same holy grove, the same crowds of men, women, and children stretched upon the floor awaiting the nocturnal visit that shall cure their ills, the same gold and silver likenesses of arms and legs and breasts—truly an amazing testimony to the wonderous vitality of the spirit of ancient Greece.

THE STUDY OF CORPORATION LAW

By John J. Sullivan
Professor of Law

The distinction between business and the so-called professions has been broken down. Business, be it banking, or commerce, or transportation, or manufacturing, or mining, or publishing, or any other line of business, has become a science in itself and a profession for those who follow it. Hence, a business man who is at the head of a manufacturing company, for instance, is required by the increasing size and complexity of modern business transactions, and by the fierce competition he must meet from outside, to know far more and to have a broader, higher business education than the head of a similar manufacturing concern was required to have a generation ago. And what is true of the head of the business is true of his subordinates. The general public appreciation of this fact is seen in the widespread and growing demand not only for technical education along specialized lines but also for a scientific knowledge of the fundamental principles of money and credit, of industrial management, of economics and of law, underlying all sound business. Modern specialization, which makes most employees mere cogs in the business machine, forces them to recognize the need of pursuing courses of study which will give them a rounded-out view of the business whereof they are each a small part.

All this is plain. In order to advance, a business man must know more than his own immediate duties. He must see how the particular business concern, which employs him in one department, is conducted as a whole. More than this, he must understand how similar business concerns are conducted, and—going one step further—how business enterprises in general are carried on. He must have a knowledge of affairs.

Now there is one modern means of conducting business

enterprises of nearly every kind—the corporation. Almost all the largest business concerns are incorporated, as well as tens of thousands of the smaller concerns. Enterprises which a few years ago would have been organized as partnerships, today are corporations. Everybody realizes this, but as yet comparatively few business men realize that in many cases it is equally important for them to understand how their corporate machinery should be run, as to understand how their accounts should be kept, and how their manufacturing and their selling organization should be managed. They are inclined to think that all knowledge of corporation law must be left to the lawyers, ignoring the fact that corporation law has become an integral part of every-day business transactions—almost as much as contract law. One doesn't consult a lawyer every time one makes a contract. This would be impracticable in view of the millions of contracts, big and little, made every day throughout the United States. And business men don't as a matter of fact consult lawyers every time a question involving corporation law arises. Being a lawyer myself, I would be glad if they did, but they don't. And they go on making blunders which an elementary knowledge of corporation law would enable them to avoid. I am not urging that business men or anyone else should obtain a mere smattering of corporation law. A mere smattering of anything does far more harm than good. It is an entirely different thing to urge that they get a definite knowledge of the elementary rules of corporation law. This will help to keep them out of trouble if only by making them understand when they should consult an expert.

What are the mistakes which the average business man is likely to make in running a corporation? These mistakes may be summed up by saying that the business man, especially if for a long time he has been associated with others in an old-fashioned partnership or running a concern by himself as an individual, is likely to ignore the fact that a corporation is a highly organized body, and that each corporate organ has its own special function and its limitations. The ordinary

business man impatiently brushes aside this fact. He realizes that he has invested his money in the corporation of which he is, let us say, President, and he refuses to be tied down by what he contemptuously calls "corporate red tape." Accordingly, he takes short cuts to reach desired ends. If the concern has been making money and is in a position to pay a dividend, he may order the Treasurer to draw checks for the amount which he thinks should be distributed among the stockholders. He ignores the fact that the Directors ought to be called together to pass on this question. He fails to realize that he and the Treasurer are personally responsible for the unauthorized distribution of the company's funds, and may be held liable at the suit of those who subsequently purchase the shares of the company without knowing of this distribution.

This kind of thing happens in the case of many small corporations. Meetings of stockholders and Directors are not held punctually. When special meetings are held, the proper kind of notice as to the business to be transacted is not given. At the meetings formality is dispensed with. Instead of conducting the proceedings in parliamentary fashion, there is a general interchange of views and frequently nothing is decided definitely. Even when a definite decision is reached, no record is kept of it. Many such companies fail to keep minutes of their meetings, and many more companies keep minutes which are models of what minutes ought not to be. The by-laws and the charter of the company and the statutory law are not studied by the management. Even when it is realized that some of the rules which govern the company are being disobeyed, no heed is paid to this matter, because the importance of living up to the rules is seldom recognized.

If a sale of a dozen spools of cotton should not get into a company's books, somebody would be severely blamed, for it is conceded by all that a record should be kept of sales which a corporation makes. But a decision of the Board which establishes an important, permanent guide for the carrying on of the entire sales business of the corporation may not be entered on the minutes, and an omission of this

character may call forth far less criticism than the other kind of omission. As a matter of fact, it is important to have all the decisions of the Board formulated carefully and entered accurately upon the minutes. But in practice, the Board resolutions, especially where they involve matters of internal management, are considered by the secretaries of some corporations as being unworthy of their serious attention.

As a result of all this, many corporations go on from year to year with very little more formality or orderly procedure than if they were old-fashioned partnerships. If the business prospers and if all those connected with it remain good friends, probably little harm will result from the inattention to procedural technicalities. But if the business, or a branch of it, gets into trouble, or if dissensions arise among those interested in the corporation, the failure to follow the rules exposes those who have been careless to trouble and perhaps to heavy monetary loss.

The chief difficulty in the way of a study of corporation law lies in the fact that there are very many rules to be learned, and that these rules proceed from many different sources. And the fact that a corporation is a complicated organism adds to the perplexity. So needlessly difficult has the subject been made that, in these days when everybody is suspecting everybody else of conspiracy, one might imagine that the complications were due to a lawyers' conspiracy to prevent laymen from readily gaining an understanding of this important matter. Of course, no such conspiracy was ever hatched in this country. But we read that in ancient Rome the lawyers arranged for a legal calendar, according to which alone certain kinds of business could be transacted. The key to this calendar was kept to themselves by the members of the legal fraternity to whom resort was required whenever a question arose as to the time for doing certain acts. Finally some outsider learned about this key and published it, whereupon the lawyers, deprived of this means of emolument, secretly arranged a different legal calendar, and so restored things to their former happy condition.

Now the multiplication of corporation laws by our State and our Federal Legislatures, coupled with the fact that most big corporations do business in more states than one, has made it exceedingly difficult for a business man to keep track of the various regulations which he must obey in helping to manage his corporation. He is confronted by numerous rules relating, let us say, to the holding of real estate by his company or to the steps which must be taken in disposing of that real estate. Some of these rules seem to conflict with others. In this situation, it is desirable, not only to study the subject of corporation law according to topics, such as the powers and the duties of the Board of Directors, the manner of calling special meetings of the stockholders, etc., but also to note the various sources where the rules governing a particular corporation originate.

Let me call your attention to this diagram containing ten concentric circles. [Begin with a small circle in the center, then draw a larger one outside of the first, and so on until you have a series of ten circles.] First let us look at the outermost of these circles, which is, of course, the largest. This largest circle represents for us the fundamental law of the land, the United States Constitution. The ordinary business man, in running a corporation, is not called upon frequently to consider the United States Constitution, but it may well be referred to as the unseen foundation upon which rests the entire superstructure of the rules which he must follow. He may not think about the United States Constitution as much as he thinks about some petty corporation By-Law defining his own powers, just as a man gazing at a building may be attracted by the ornamental Corinthian capital of some stately column in front of a building, and never think of the solid masonry below, which sustains the whole fabric. Thus, in the clause of the Constitution forbidding any state to deprive any person of life, liberty or property without due process of law, or to deny to any person within its jurisdiction the equal protection of its laws, we find a firm basis of property rights which protects corporations (as well as individ-

uals) against various kinds of unjust encroachment. Again, the Constitutional provision forbidding a state to pass any law impairing the obligation of contracts, is a bulwark of corporate charters.

The next circle represents the Acts of Congress. These do not touch the corporation at many points. But the Act of Congress approved on September 8, 1916, doubles the income tax payable by corporations, and imposes a capital stock tax upon large corporations. Moreover, the United States Bankruptcy Act, the National Bank statutes and other Acts of Congress are of importance to numerous corporations.

Leaving these rules of nation-wide scope, we come to the third largest circle, representing the Constitution of the particular state from which a given corporation has received its charter. For instance, the State Constitution of Pennsylvania regulates increases of the capital stock and the indebtedness of corporations, and lays down other rules which may be of importance to a corporation. These rules are state-wide in scope, as are those of the fourth circle, representing the statute law of the state from which a given corporation has obtained its charter. Here we have a prolific source of rules, because the legislature of a state has general supervision over corporations organized in that state. Numerous regulations respecting the formation, the management and the dissolution of a corporation emanate from the legislature of a corporation's home state.

Now we leave these rules which are state-wide in scope and come to the fifth circle, representing the municipal ordinances of the city where the company has an office, or the ordinances of the borough where, perhaps, its factory is located. These local regulations may relate to building construction, dealers' licenses, etc., but, so far as they affect the corporation, they must be heeded by its officials.

Next we come to the sixth circle, representing a given company's charter. The charter lays down rules which apply only to the particular corporation—for example, what shall be the scope of its business, the amount of its authorized capi-

tal, the par value of its shares, the location of its principal office.

The seventh circle represents the rules which originate with the stockholders when they adopt a set of By-Laws, the company's domestic regulations. These may define the powers and the duties of each officer, state the time and the place for holding meetings, the order of business at meetings, etc.

The eighth circle represents rules which are derived from standing resolutions or orders of the Board of Directors. Thus the Board may order that the business of the company shall be transacted in a certain way, and this will constitute a rule for the guidance of the executive.

The ninth circle represents standing orders made by some official or subordinate agent of the company. For instance, we see posted in many factories a set of rules formulated by the superintendent or by someone in charge of this or that division of the work.

Finally, the tenth circle stands for those rules which cannot be traced back to their origin, but which have been lived up to over a considerable period of time. In carelessly run companies, we find many practices and methods of transacting business whose source nobody can tell. Nevertheless, they are time-honored regulations to which all submit, and in very many cases, upon proof of such established practices, a judge gives his decision on the basis of these regulations, the same as if they had been laid down formally by some recognized authority. Of course, in a systematically conducted corporation, it is usually possible to follow everything back to some authoritative source. For example, the duties of some workman can be shown to have been assigned to him by an assistant foreman, whose appointment is in turn traced to the general superintendent: then the general superintendent's authority in this and other matters is defined in a resolution of the Board of Directors, and the entire scheme of corporate management is worked out clearly and explicitly.

These ten sources of rules governing those who manage the affairs of corporations are arranged in the order of their author-

ity. Very frequently rules are made for a corporation without due regard for existing rules, and a conflict arises as to which of two inconsistent rules shall prevail. If we consider the two rules in the light of the authority of the parties from which they respectively emanate, we can see instantly which rule stands and which falls. Again, when it comes to a question of the repeal of an existing rule, we may state, as a general proposition, that the repeal can be brought about either by the same authority that established the rule, or by a higher authority. To this general proposition there are certain exceptions, most of them being due to the fact that sometimes vested rights which cannot be disturbed may prevent the repeal of a rule.

Besides the ten sources of rules already mentioned, many corporations which do business outside of their own home state must heed rules proceeding from still other sources. Thus a New York corporation establishing a place of business in Philadelphia must obey those provisions of the Pennsylvania Constitution and statute law which regulate foreign corporations doing business within this state. Again, the New York corporation must comply with the Philadelphia ordinances, so far as they affect the New York concern, in the matter of building regulations, fire escape provisions, etc.

But enough has been said to show that the lot of those managing a corporation is not altogether a happy one. They are enmeshed in a network of rules and the number is being added to every year. We are suffering from too much legislation, and from legislation which is railroaded through in obedience to some transient popular whim without a study of existing laws or a knowledge of the business conditions which will be affected by it. The old Jeffersonian principle, that that nation is best governed which is least governed, has been abandoned for the principle that that nation is best governed which is most governed. The constitutional bulwarks of liberty and property which were built by the fathers in the early days of this country, as a result of the tyrannical encroachments of the English government, are needed more than ever today. For today in many of our states the legislative and

the executive branches of government are currying temporary popular favor by adding to the drastic laws and rulings under which a continually heavier burden of taxes and requirements for itemized reports and accounts, and minute regulations for the conduct of business, is laid upon the corporations. I say "temporary popular favor" because, in the end, the people will realize that they suffer themselves when an unjust attack is made upon corporations. Corporations are simply the up-to-date ways and means of doing business, and to treat them unjustly is to hamper business and to injure the people as a whole.

CONSTRUCTION OF THE MODERN SKYSCRAPER

By Thomas Nolan

Professor of Architectural Construction

The Evolution of the Tall Building

During the last quarter of a century perhaps the most notable progress in architecture in the United States has been in the development and perfection of the structural requirements of the tall building. The steel "skeleton" or "cage" construction was a natural result of conditions imposed by commercial interests. In our large American cities, and especially in those whose areas are in any way restricted, as in the narrow Borough of Manhattan, New York, for example, it has been found desirable to concentrate office-buildings within a relatively limited space; and the resulting demand for greatly increased floor-space has resulted in high buildings. It has been well said[1] that our "skyscraper architecture is omnipresent and insistent and the most conspicuous, revolutionary [illegible] American architectural product of the last twenty-five years, from Jenney & Mundie's Home Life Building in Chicago and Bradford Gilbert's Tower Building addition in New York to the 750-foot Woolworth and the vast Equitable in New York, and Boston's much-lauded Custom House. It has been more 'cussed' and discussed than any other modern type. It has changed the skyline of New York and of every large American city from Seattle to Bangor, from Los Angeles to Galveston. It has produced a new architectural style, irrespective of that of its varied decorative trimmings; and it speaks so loud for itself as to make further words almost unnecessary."

The inception and growth of the high building has been made possible by the introduction and rapid development of struc-

[1] Professor A. D. F. Hamlin, in "Twenty-five Years of American Architecture."—*The Architectural Record*, July, 1916.

tural steel, light fire-proof materials, passenger and freight elevators, and by great advances in the mechanical equipment, isolated foundation-supports, and wind-bracing. The steel skeleton frame has been classified as the last of the four great developments or structural advances which have given architecture really new resources, the first being the Roman vault, the second the Gothic-ribbed vault and flying arch and buttress, and the third the metallic truss.

A comparison of some of the earlier forms of iron construction in buildings with those in use today shows some wonderful changes, and demonstrates also that most of our present combinations and forms of steel were unknown in engineering or building practice sixty or seventy years ago. The floor-girders and beams of the old Boston Public Library, demolished in 1899, were made of cast iron and carried heavy segmental brick floor-arches. The floor-girders of the old Sedgwick Hall at Lenox, Mass., were made of three wrought-iron plates, two of them horizontal for the flanges and the third vertical and corrugated for the web. Rolled wrought-iron floor-beams succeeded cast-iron beams and were first rolled in this country at Trenton, N. J., in 1854, and steel beams were first manufactured in 1885 by the Carnegie Steel Company, at Pittsburgh, Pa. From about 1855 to 1870 many buildings were constructed with the entire fronts made of cast iron instead of masonry, the idea being that cast iron, being incombustible, is consequently fire-proof or very fire-resisting and superior to all stonework in that respect. But some failures of fronts in fires raising the temperature to 1000 degrees Fahr., demonstrated that such construction is unreliable, and it was, therefore, abandoned. With the advent of tile fire-proof covering and protection all iron and steel constructive parts of buildings were covered and continued improvements in the manufacture and use of each material encouraged the development of the other.

Previous to 1885 "tall" buildings were not more than eight or ten stories high; this height was very nearly the practical limit, and their construction was then sometimes referred to as "elevator architecture." In these early buildings the walls

carried the floor-girders and beams and the loads coming upon them; and when the sectional areas of the masonry of the piers of the exterior walls of the lower stories became so great that they affected seriously the use of these stories because of the loss of floor-space and light, the practical limit of height was reached. The next stage in the evolution of the tall building was the one in which the entire weight of the floors and roofs and the loads on them were carried by a system of metal columns, the exterior walls thus supporting no load but their own weight. Buildings were carried by this form of construction to the height of eighteen or nineteen stories. The limit was reached when the outside metal columns were made to carry not only the floor-loads but also the outside masonry walls themselves, which were then made relatively very thin, and ceased to be constructive or load-bearing.

With the introduction of cheap structural steel the "skeleton" or "cage" construction came rapidly into use. Formerly the "skeleton" type was carefully distinguished from the "cage" type of tall-building construction, the former term being applied to buildings which might have the outside walls self-supporting and which depended somewhat for stiffness upon walls, partitions, floor-filling, etc.; and the term "cage" being applied to buildings which consisted of a complete and well-connected framework of metal designed to carry not only the floors but the walls, roof, and all other parts of the structure, and furnished with wind-bracing members. In this more advanced and approved type the construction has the characteristics of a single unit in its metal framework, which is made complete in itself, like a wire cage, independent of the external covering and possessed of sufficient lateral strength and stiffness to resist the wind or other external forces. Today no very high buildings are constructed with self-supporting walls going down to the foundations, and the expression "skeleton construction" is used to define generally all buildings which have a metal frame of columns, girders and beams supporting the outside walls as well as the floors and roof and the loads on them.

There has been some controversy in regard to priority of

invention or first use of metal skeleton construction. Like so many systems of construction its history is a history of improvements. It is generally agreed that it was first developed in Chicago in 1889 and recognized as a definite and new contribution to the science of construction in American architecture. It is thus, as Professor Hamlin says, "from the metropolis of the Middle West that the two most potent forces emanated that have transformed modern American architecture, the development of steel skeleton construction from 1889, and the influence of the great Chicago exhibition in 1893."

It would be impossible in a brief and non-technical review of the problems presented for solution to the architect and engineer to refer to them all. It may be possible, however, to mention some of the most important of them and in as untechnical a way as the subject will admit, to explain in general the methods of their solution. It is the purpose of the speaker to show on the screen by lantern-slides some of the recent tall buildings and a few diagrams illustrating the mechanical principles involved and the engineering devices employed in some parts of the construction. The details referred to relate especially to the Foundations, the Steel Frame and the Wind-Bracing, with brief references also to the Cornice-Supports Floor-Arches and Curtain-Walls. References also will be made to Concrete Construction with illustrations of some contemporary buildings built with that material.

The Foundations of High Buildings

The present requirements of foundation-design for high buildings make the problems very complex when compared with those pertaining to simple offset masonry footings for structures of no great height or weight. The areas of the former are often small and the loads large and concentrated, and the weakness of the soil or foundation-beds must be overcome by various engineering expedients; or the material met with must be penetrated, or removed and the columns or their supports made to rest on solid rock. The underlying material varies greatly in different cities and consequently the types and details

of foundations under high buildings also vary. In the development, also, and the gradual perfecting of these foundations during the past thirty years, there have been decided changes in methods employed to meet somewhat similar conditions. Thus, in Chicago previous to about 1885, extensive foundations were often built of successive layers of large stones stepped out until a sufficient base was obtained. Following this method came the one involving the use of rails, I beams, or riveted girders embedded in concrete, forming what was sometimes called "surface-foundations," or "floating foundations." and now commonly known as "spread foundations" or "grillage-foundations." In Boston piles were and are still used very extensively, capped at first with granite capping stones only, but now often with reinforced concrete. In New York City, accompanying the use of the skeleton frame, pneumatic caissons have been largely employed to carry the foundations of high buildings down to the rock. Open caissons or open cylinders, large metal pipes filled with concrete, have been and are still largely used to carry the column-loads down to a solid unresisting stratum in locations where there is not too much subsoil water to require pneumatic caissons. This type of deep foundations has revolutionized building operations, in Chicago especially, and has largely done away with grillage-footings on strata nearer the surface of the ground and eliminated the threatened and often actual disturbance of the foundations of adjoining structures.

Concrete-pile and wooden-pile foundations are still used under certain conditions. In some cases the former are more desirable and in other cases the latter. Wooden piles are driven deep enough to be always below the low-water level. One objection to the use of piles for deep foundations, even if suitable to hold safely the loads, is the disturbance their driving sometimes causes to adjacent buildings. Before the introduction of the more modern types of deep foundations in Chicago, for example, the driving of the piles within a few feet of other buildings on spread foundations caused the latter in several instances to settle enough to necessitate underpinning. Never-

theless, pile foundations for heavy buildings are still particularly desirable under certain conditions, and one of the most impressive examples of very recent wooden-pile foundation-construction under a very large and heavy building is that of the Traymore Hotel of Atlantic City. From the study of the piling-plans of those buildings under which piles constitute the foundations, such, for example, as the plans of the Boston Chamber of Commerce Building, it will be seen that most of the stones rest on three piles and a very few on two piles. The reason that stone capping blocks are not placed on four piles is that they will usually tip off of one of the four and come to a bearing on three.

A type of foundation-construction which has been used to support heavy buildings over compressible or filled-in soil, where wooden piles or spread-footings could not be employed or were not considered desirable, involves the use of masonry wells. These wells were placed under the City Hall, at Kansas City, Mo., and this building is mentioned here because this example is one of the earliest in this country. The metal shells, four and one-half feet in diameter, were filled with vitrified bricks laid in cement mortar and were sunk through filled-in ground to a stratum of limestone, eight feet thick, and fifty feet below the grade. On these masonry-filled wells rested the girders bearing the walls, and through the piers which carried excessive loads, passed riveted steel columns to the rock, thus dividing the wall-loads from the column-loads.

The inverted-arch system of foundations for heavy buildings was used for the footings under the Drexel building in Philadelphia and for the footings under the World Building in New York. In the latter, early type of high building, the walls are self-supporting and very thick at the base. This type has now passed into disuse and was not employed unless the columns were widely spaced and the foundation-bed loaded with not more than two or three tons per square foot. Unless the piers are about equally loaded it is, as a rule, impossible to distribute the weight evenly and the thrust on the end-arches must be resisted by strong ties. About the only advantage over ordi-

nary masonry footings possessed by inverted arches is in the resulting shallower foundations.

Steel-beam grillages are employed to distribute loads over a greater area of foundation-bed. It is to be noticed that the use of beam-grillages is not confined to foundations on clay and other compressible materials, but is used also over rock, as in the foundations of the Metropolitan Life Insurance Company's Building in New York. This method is employed also to further distribute heavy column-loads in high or heavy buildings by resting two columns on one longer grillage. Four columns, also, are often supported one on footing of this type. Excavations are often made down to or into the solid rock and the column-bases set directly on a carefully dressed-off surface of the rock without the use of any beam-grillage.

The pnuematic caisson is resorted to when foundation walls or piers of very high and heavy buildings must be carried to a considerable depth through water-bearing materials. It is really based upon the principle of the diving-bell, and consists of an air-tight working chamber and air shaft connected with an air lock at the top, and arranged so that compressed air may be forced into the working chamber to prevent the water from entering it. The caisson is sunk to rock or hardpan by excavating at the cutting-edge and hoisting out the material through the shaft. The concrete or brick pier is built on the caisson to the required height to receive the column and the working chamber and shaft finally filled with concrete. The earlier caissons for buildings were made of heavy timbers, of which material, also, the side walls and roof were frequently made. They were often constructed of steel, but in the latest examples reinforced concrete is generally employed for the working chamber, the only structural steel being in the cutting-edge.

One method of solution of a most important problem in architectural engineering involved in the construction of high buildings is by the practical application of the principle of the cantilever which is often used in connection with caissons or with steel grillages or both. It was in the foundations of the Manhattan Life Insurance Company's Building, New York,

that pneumatic caissons were first employed for foundations for buildings. Cantilever supports were used for the side-wall columns and their loads. Mud and quicksand constituted the natural soil at the site, which is in lower Broadway, New York, just below Wall Street. The caissons went down about fifty-five feet below grade to bed-rock. Brick piers were built on the caissons to support the cast-iron columns, and an elaborate system of cantilever girders was used to transfer the column-loads of the side walls to bearings over the caisson piers. By this ingenious type of construction it was possible to sink these foundations for the heavy seventeen-story building through soft material to the solid rock without seriously disturbing the shallow footings of the buildings on either side of the lot.

Among the many examples of the earlier very high buildings resting on caisson piers and cantilevering the loads of the wall columns to the steel-beam grillage on top of the caisson piers, may be mentioned the Singer Building in New York. This building is forty-one stories in height, with a tower 612 feet above the street level, and the load on the foundations approximates twenty-seven tons per square foot. The caissons were sunk through wet soil, fine sand, quicksands and fifteen feet of hardpan to bed-rock, ninety feet below the curb. The adjacent buildings on each side, with their shallow wall-footings, are heavily underpinned with large concrete-filled cylinders sunk to bed-rock. A very interesting example of heavy needling, underpinning and cantilevering was furnished by the foundations of the Old South Meeting House and the eleven-story Old South Office Building, and in connection with the construction of the subway tunnel in Boston. The walls of both buildings had to be heavily underpinned with new concrete walls and the walls of each building in turn were used to load one arm of the cantilever while the new deep foundation walls of the opposite building were being put in.

Some Examples of American High Buildings

Having explained in a general way some of the problems of foundation construction for high buildings, Professor Nolan

explained the most important constructive details as the buildings themselves were pictured in the lantern-slides. The examples were taken at random, but illustrated the types of structures for which foundations similar to some of those just discussed have been designed and put in. A view of Trinity Church, New York, illustrated the dwarfing of that beautiful landmark by the surrounding high buildings. In this same picture were seen the twenty-three-story American Surety Office Building on Broadway, with a height of 306 feet, and in the distance could be seen, also, the twenty-story Gillender Building, erected at the corner of Wall and Nassau Streets, but already replaced by the still larger and higher building of the Bankers' Trust Company, with thirty-nine stories, and a height of 539 feet. The Trinity Office Building, just north of Trinity Church churchyard, with twenty-one stories and a height of over 280 feet, is a good example of a narrow, deep building. A view of City Hall Square, New York, was next thrown on the screen, showing the beautiful City Hall, designed by the French architect Mangin, and built during the years 1803 to 1812; and showing also, on Broadway, the Postal Telegraph Company's Building and the building of the Home Life Insurance Company. These two office buildings are examples of the earlier skeleton-frame construction, the Home Life Building being fifteen stories in height and having a self-supporting front wall of white marble.

To further illustrate the growth of high-building construction, photographs were shown of the following structures: The great office building of the Equitable Life Insurance Company, at 120 Broadway, New York, recently completed, taking the place of the former building destroyed by fire, containing thirty-seven stories, reaching a height of 486 feet, and rated, in point of view of floor space and area covered, the largest office building in the world; the Hudson Terminal Building, Church Street, New York, with twenty-two stories and a height of 276 feet above grade; the building of the City Investing Company, at 165 Broadway, New York, with thirty-three stories and with a height of 487 feet; the Land Title and Trust

Company's Building, Philadelphia, the newer portion of which building is twenty-two stories high; the North American Building, Philadelphia, twenty stories high; the adjoining Real Estate Trust Company's Building, seventeen stories high, and the fourteen-story building of the Prudential Guarantee Company, in Buffalo, N. Y., an excellent example of exterior terra-cotta curtain walls, with some noted details designed by Louis H. Sullivan.

Wind-bracing

The problems presented to the Architect and Engineer having to do with what is called "wind-bracing" in high buildings, are relatively technical in character, requiring in their detailed solution considerable computations; and it is only possible here to present them in the most general way. A tall, narrow building is like a huge cantilever built into the ground and occasionally subjected to a load or pressure, assumed to act horizontally and reaching, with a very high velocity of the wind, a unit force of about 30 pounds per square foot of surface on the exposed sides. When buildings of from six to ten stories were erected with solid masonry walls little attention was paid to stresses due to wind-pressure, but as they increased in height and were built with the skeleton steel frames and with light curtain walls, the resistance to this pressure had to be considered with care. The proportions of the building generally determine to what extent special bracing must be provided. In buildings under 100 feet high, provided the height does not exceed four times the average width at the base, wind-pressure is usually disregarded.

In the general theory of wind-bracing, buildings are usually considered to resist the wind as cantilever girders or trusses, planted in the earth. The long, high side walls exposed to the wind, together with the columns and beams in these walls, act as the flanges of the girders, while the narrow end-walls, together with their framing and with other intermediate lines of vertical steel framing, form the web of this cantilever and act to transmit the vertical shears. Ordinary floor constructions are

usually sufficient to transmit wind-loads to systems of vertical bracing, so that it is seldom necessary to put in steel bracing in horizontal planes; but occasionally cases arise in which wind-bracing is added to the floors, as in the tower of the new Custom-House, in Boston, where the various open elevator and staircase walls interfered with the transmission of some of the stresses at each floor to the wall-bracing designed to resist them. Wind-bracing is usually arranged in a system as nearly as possible symmetrically placed about the axis of each exposed face, but the shape of some buildings is such that it is not possible to provide bracing, the stiffness of which will be equal in lines symmetrical about the center of wind-pressure. In structures of triangular plan, like the so-called Flatiron Building and the Times Building, in New York City, these difficulties are especially apparent. In structures of this type there is a tendency to twist about a vertical axis, and engineers find that the analysis of the resistance offered by a building to a twist of this sort is unsatisfactory and complicated. They also find, however, that the stresses developed in any usual case are relatively small and generally negligible.

The well-known twenty-story Fuller Building, or "Flatiron" Building, at Broadway and Twenty-third Street, New York, is 286 feet in height and approximately a right-angled triangle in plan. The details of the wind-bracing of this building were very carefully studied, and the provision against the twisting of the building by heavy winds was made by the use of the deep spandrel plate girders at the floors of most of the stories, and also by gusset-plates and knee-braces. The Times Building, at Broadway and Forty-second Street, New York, with twenty-eight stories and a height of 420 feet, is another good example of a high building, triangular in plan, and presented special wind-bracing problems.

There are several different types of wind-bracing. The sway-rod type is now little used, although much in vogue in the earlier steel skeleton buildings. When placed in outside walls the rods cut up the masonry, and when placed in partitions they interfere with door and other openings. The knee-brace

type is a very common and efficient one, and is used extensively in exterior walls and with the interior columns and girders. The gusset-plate type of wind-bracing is perhaps the most common form today. While it is not an economical type, requiring as it does considerable field riveting and sometimes developing relatively large bending moments in columns and girders, gusset-plates still accommodate themselves to wall openings and are easily covered by masonry and architectural devices. The lattice-girder type is employed sometimes when unusually deep bracing is required for stiffness and when light stresses are developed. The portal type of wind-bracing has been used in some important high buildings, but is relatively expensive and unwieldy. It can be used with effect in wide openings between columns. It develops practically no bending moments on the columns and floor girders. This system, with solid curved webs, was first used in the Old Colony Building, Chicago, completed in 1894.

Certain types of high buildings are known as "tower-buildings." Such is the building of the Metropolitan Life Insurance Company, on Madison Square, New York. The Metropolitan Tower, rated as a fifty-story building and reaching a height of 700 feet, is about 75 by 85 feet in plan throughout the lower stories. The wind-bracing was carefully considered and is a very important feature of the structural design. No dependence is placed upon the walls as aids in resisting wind-pressure which was calculated at the full value from top to bottom at thirty pounds per square foot of surface. The wind-bracing consists of plate girders in the walls at each floor level, with knee-braces and gusset-plates for the joints. The design of the columns was influenced by the necessities of rigid connections with the bracing. The dead weight of the tower develops a moment of resistance against overturning far in excess of the moment of overturning due to the force of the wind. The Singer Building, at 149 Broadway, New York, referred to before, is another example. The tower-part has forty-one stories, is 612 feet in height, and has a very carefully designed and efficient system of wind-bracing. The tower of Madison Square

Garden, New York, 300 feet in height, an exquisitely beautiful design by McKim, Mead and White, was completed in 1890. This is a much earlier building, but the tower is mentioned here for purposes of comparison with the later tower structures. The Woolworth Building, at 233 Broadway, New York, has twenty-eight stories in the main building and fifty-four up to the observation gallery in the tower. The total height above grade is 750 feet, and the depth from grade to bottom of foundations is 125 feet. The tower is 86 feet square and elaborately braced to resist the action of the wind. This great building includes most of the problems in architectural engineering and reaches about the limit of achievement in this type of structure. It houses about 9,000 people and requires twenty-eight high-speed elevators to handle them.

Professor Nolan completed the lecture by explaining some of the details of the steel frame, the floor arches, cornice supports, etc., and by showing numerous additional lantern slides of recent important buildings in New York, Boston, Philadelphia, Chicago and other cities, inluding, in New York, the Pennsylvania Railroad Terminal, the Gorham Building, the Public Library, the Columbia University Library and St. Paul's Chapel, the University Club, the Metropolitan Club, the Stock Exchange, the Brush Stadium, etc. To illustrate the wonderful change in the skylines of New York caused by the American skyscraper architecture, several slides were shown of the present skyline of that city taken from the North and East Rivers. Some interesting views also were added of recent structures and foundations of mass and reinforced concrete.

SOCIAL SERVICE PROBLEMS IN EUROPE

By D. J. McCarthy
Professor of Medical Jurisprudence

A consideration of the methods of treating some of the large problems met with in Europe during the progress of the present war. This has nothing to do with the causation of the problem, but is concerned purely and simply with the technique, so to speak, of studying the problem and applying the remedy.

The problem of child saving exists in all the countries at war, due to the diminishing birth rate and the complications of food and the mobilization of women for industries. This problem is met as in peace times by the enrollment of a large number of social service workers concentrating their attention on the new-born and the mother.

The larger problems are much more complex and involve factors not met with in peace times. They exist in all the countries where the normal life has been partially or completely dislocated by military campaigns. Such problems exist in Belgium, Poland, Servia, the German occupation of northern France, and that portion of France occupied by the British Army as a military zone. In Germany, Russia and France, the prisoner of war situation presents an extremely complex social service and sociological problem from the standpoint of the neutral governments to whose care the interests of the prisoners of war are entrusted.

The simplest of these problems, the readjustment of the social life of the civilian population in the occupation zones, has been given up as an almost impossible problem on account of the impermanency of the field of work. After a survey of the situation by committees of neutrals, it was decided to relieve the most pressing issues, that of children and adolescents

compelled to live in a military camp by the transfer of these children or as many of them as they could care for to institutions outside of that portion of the zone. (The battle line in France occupied by the British Army and a zone of from five to ten miles back of it can only be considered as the military camp of a foreign if friendly power.) The solution of the most pressing problem in this area almost solves itself after a careful survey. The experience of the philanthropic workers in Europe has established one fairly definite principle, *i. e.*, that money expended without a survey of the field and a fairly accurate knowledge of the conditions to be met and the most pressing needs to be relieved, is for the large part poorly expended and with a large element of waste.

If one studies the organization and methods of the Commission for Relief in Belgium, a scientific marvel is presented of how to meet an extremely complex problem with complete efficiency and without waste.

One cannot well imagine a more complete disorganization of industry and government than was presented for the Voluntary Committee of Americans and Belgians in the opening days of the war. To the people of Belgium in a single night all that seemed stable in their lives was swept away, leaving them in a condition of panic and overwhelming dread. There was almost complete disorganization of the agencies for the support of the national and communal life. The banks were closed, credit was withdrawn, industries were paralyzed, transportation by rail and boat destroyed, imports suddenly stopped, and the food for a nation that lived to a large extent on imported food almost completely lacking. Certainly if something were not done and done quickly, the world was to witness the tragedy of a nation starving under its very eyes.

When the Committee for Relief in Belgium was organized with Mr. Hoover at its head, there was no time for a detailed survey. A glance at the situation to a trained mind showed the tremendous scope of the problem, and notwithstanding the fact that the Commission had only $500,000 in sight, they immediately made contracts for $2,000,000 for food per month.

The problem of survey could be worked out simultaneously with the early distribution of the food.

It was at this juncture and to meet this portion of the problem the genius for organization and the ability to think straight that led the commission to a plan of organization that has worked to almost full efficiency.

Two methods were open to the commission to get its survey and distribute food to the nation without waste or doing damage by pauperization of the people it was to help: (*a*) A centralized scheme, with a director at the head who would appoint inspectors and distributors to be sent into the provinces and report independently to a central office. This method involved a large beaurocratic organization with heavy overhead expenses, endless records, contracts, audits, etc. This, as will be seen later, was the method of food control in Germany. (*b*) A method of decentralization (the method of the Belgian Relief Committee) whereby the local communities were made the chief factors in the scheme of survey and distribution. Small committees were organized for the population units of about 2,000 to cover the entire country. These small local committees were composed of the prominent citizens, business men and prominent farmers of the locality—men who had intimate knowledge of the people, their resources in food production, their needs for complete or partial aid in the food distribution. These small committees were in sympathy with the people and the people with them. These 2,000 small committees reported to a larger provincial committee and the Provincial Committees to either a Regional Committee or the National Committee at Brussels.

The relations of the American members of the commission to these various committees were advisory for the most part, but at times in the nature of a control, inasmuch as they, the American members, were responsible to the allied governments for the proper and equitable distribution of the food and guarantor against either waste or leaks into the countries of the central powers. The relation of the American supervisors in this scheme was somewhat similar to that of the British Civil

Service in the scheme of colonial government in India as related to the native control of its own supporting functions. The distribution of the members of the commission in Belgium is proportioned to the committee actions and their values. A member is assigned to each of the Provincial Committees as governor of action of this district. Where the provincial area is large, sufficient regional assistants are appointed to cover the territory and work in intimate relationship with the sub-committees.

The value of a decentralized scheme of this sort becomes immediately evident. Surveys are needed from time to time. The survey of the food production and food reserves of a nation is a stupendous task. With small committees in intimate knowledge with its own people a survey of the 2,000 people, what they can produce in cereals, meat, food, etc., becomes relatively simple. When this is assembled for the 2,000 sub-committees representing the entire nation, it becomes a matter of easy calculation, giving reliable and trustworthy results. In distribution of food, the small regional sub-committee has first-hand knowledge of the wealth and position and reliability of all their people. For those who could pay, the food was sold at times at cost, at times even at a profit to supply the deficiencies of those who had to be partially helped or completely cared for. Those profits made from the sale of food to the well-to-do in Belgium for the first two years in round numbers were $22,000,000 and this sum was used exclusively in helping the destitute. This was in the nature of a self-imposed tax. It might be here stated that the Belgian well-to-do have helped their own destitute directly and while the extent of this is not known, Mr. Hoover believes that the total will not be less than $50,000,000.

In the direct application of this scheme of organization to meeting specific problems, its efficiency becomes immediately evident. Take, for example, the very large problem of bread. It would be simpler to import milled flour from the United States. The commission, however, decided to import the wheat and mill it in Belgium. This not only gave employ-

ment to the Belgians, but in addition to this a saving of four per cent in the quantity of the flour milled from the wheat. This of course was only effected after careful experimentation and testing. When it is borne in mind that up to the end of November 1, 587,890 tons (45,823,680 bushels) of wheat were imported, the saving represented by this four per cent can easily be estimated. In the distribution of the bread, the use of the bread card as employed in Germany, was not considered. The flour was dealt out to the bakers by the small sub-committees; the bakers were permitted to sell only to the customers known to them and assigned by the committee. If any part of this group failed to get their allotted portion of bread per day the fault lay with the baker. His flour supply was withdrawn and the distribution assigned to another baker. The complex card system with control and recording by a complex office system was entirely avoided. The loss from complete effectiveness by this method was less than five per cent. To get this reduced to say two per cent would have entailed expenditure of money and energy and time that was not worth while. By the above system, the cost of bread to those able to buy was kept as low as four cents per pound, less than in countries at peace, but still as much as the impoverished state of the country could stand.

The same business efficiency was applied to other food products and to such an extent that the commission was looked upon in many ways as a business organization. It was indeed a remark of sarcastic opprobrium to the workers of the commission addressed to them by the Germans—"How is the business doing?" or "How is business today?"

It is a rule of wise philanthropy and social service that a nation or people or group should not be pauperized or patronized. The Commission for Relief in Belgium has wisely kept this in mind, and as far as possible has respected and maintained the *amour propre* and self-respect of the Belgian people in every way—as in the bread problem—to keep the price as low as the population could afford and yet beneath the cost of production—to give it free only where it was absolutely

necessary and where investigation by their own people showed it to be necessary. This same principle was shown in the problem of help to the growing child.

What was at first apparently a food problem evidently became a problem in diplomacy and when the survey for distribution was completed another problem, *i. e.*, the problem of health and the prevention of disease due to insufficient nutrition was added to this. A health survey was decided upon and this in spite of many difficulties was admirably done by Professor Lucas of the medical faculty of the University of California. This survey carried out along strict scientific lines showed that the agricultural class which has been directly or indirectly able to secure a sufficiency of foodstuffs, is, broadly speaking, in a normal state of health. The same may be said of the well-to-do classes who have been able to purchase both native and imported supplies. On the other hand, the high prices obtaining for native products have made it practically impossible for laborers and minor commercial people to secure the necessary supplement to their *pro rata* of the commission's importations. These classes comprising something like 5,000,000 people generally show diminished vitality, although the infants owing largely to the natural solicitude of the women of Belgium and to the special institutions supported by the relief organizations are really above normal in general health. The improvement in infant mortality, however, has been more than offset by a marked reduction in the birth rate, considered to be largely due to the under-nourished and anxious state of possible mothers and by an increased percentage of imperfectly developed new-born babies, the ill-nourishment of mothers being also responsible here and being further reflected in the curtailed nursing period. In the case of children in the adolescent stage, there is an alarming increase in tuberculosis, due to the lowered power of resistance consequent on inadequate diet. It is to correct this serious tendency that the system of school feeding previously referred to is being installed.

Evidently the health problem needing immediate attention

was extra food for the adolescent child. This was evidently an urgent matter if serious consequences from a nervous and mental health standpoint were to be avoided. The very natural impulse would be to distribute extra rations to these children with the hope that it, or at least some of it, would reach the children for whom it was intended. This, however, was and is not the method of the Belgian Relief Committee. After a careful study of the problem, it was decided to add an extra school meal to these children. The people of Belgium and the children would consider this a part of the governmental function of education of the child. It would not be charity administered by the commission. This method would not only reach that part of the population for whom it was intended and that portion only, but it would reach them without ostentation or evidence of charity. In other words, it was again a part of the policy of the commission to save the self-respect of the Belgian people and help them help themselves. In other ways, the education of the children was fostered by the commission, but this particular idea is quoted to show the principles which guide the commission in its work.

To carry out this part of its work, the commission has appealed to the American people to give $1,000,000 per month, say one-tenth of the total requirements, to cover the cost of a much-needed supplementary meal for the school children, this seeming to be the most effective means of safeguarding the coming generation against the ravages of tuberculosis and other diseases now increasing at an alarming rate in consequence of the inadequate food supply. In the face of such a situation, is it too much to ask of America that she support the commission to the extent asked for? Surely, it is a matter of national pride that in the name of America, it has been possible so long to succor the sorely stricken people.

It is impossible in the time allotted to me to go into other details of the working of the commission. To return, however, for a moment to a contrast with certain elemental principles in this plan as compared with the German method of food control and distribution, I might call attention to the fact

that after the German food survey under Professor Batocki, the food dictator, the food was left largely in the hands of the grower or the middleman. In the Belgian plan, all the food was garnered into warehouses and the distribution made to provincial committees under absolute control. Under the German method, even when the survey was accurate, after a period of two or three months, it was found that inasmuch as the food was left in the hands of the producers or the middlemen, many problems were presented of the disappearance of very large quantities of food due to faulty manipulation or intentional use of the food products for fodder, etc. Under the Belgian scheme of organization, inasmuch as the food products were kept in central warehouses under direct control, the commission had always definite knowledge of its food reserve.

Under the centralized German method, there was always much discussion by food experts as to the accuracy of the survey, etc. By the decentralized method in Belgium, repeated surveys gave accurate results that have not been questioned.

It might appear from my remarks that little direct help was extended to the Belgian people. In a recent survey, the commission reports that "we estimate the number of people on the communal soup kitchens at 1,700,000, the number of children fed by the canteens at 120,000 and the children who will participate in the public school feeding at 1,000,000; or approximately 2,820,000 whose 'carte de Menage' ration must be further supplemented by expanding the operation of these relief organs."

The organization for the care of the children has been divided as follows:

First.—Canteens for nursing and expectant mothers, which as already stated furnish a substantial supplementary meal. There are over 13,000 nursing and expectant mothers receiving these dinners.

Second.—Canteens often in conjunction with maternal canteens have been instituted for infants under three years of age in which there are 52,000 infants receiving milk and cereals.

Both these types of canteens have undoubtedly had a great influence on the reduction of infant mortality in Belgium. There is no question that more is being done for the mother and the child today than was ever done before. Previous to the war, there were only two maternal canteens in the whole of Belgium—today there are about 130 throughout the country and more than 330 canteens for infants. These canteens in connection with the educational work, the medical supervision which all canteens have, and the careful regulation of the dietary, both in the canteens and by an extensive system of visiting nurses in the homes have had a very definite effect in reducing infant mortality. This phase of the child welfare work in Belgium is one of the best examples of the efficiency of the extensive and carefully worked out preventive measures which have been instituted throughout Belgium by the relief organization.

Third.—Besides these canteens for mothers and infants, special canteens have been started to give food supplementary to the ordinary ration to debilitated children from three to seventeen years of age. These children are chosen from the poorer sections after a medical examination and receive a supplementary dinner.

Each canteen is under the direct supervision of a medical staff, which not only prescribes the proper dietary but also looks after special health problems. A health card is made out for each case, on which the weight is entered from month to month. A review of several hundreds of these cards brings out some very interesting facts. It is generally noted that on admission and for the first two or three months afterwards, a large proportion of these debilitated children gain in weight. Then they reach a stationary period which lasts for a month or two and then either stop gaining entirely or lose slightly, so that the average amount gained for a period of a year is considerably below the average amount which children of their respective ages should gain. In these canteens over 25,000 children are being fed at the present time. Up to the first of July, 1916, the age limit was fourteen years; since the first

of July, however, this age limit has been increased to seventeen years to make room for the thousands of debilitated adolescent children who during this period of rapid growth—a period which requires a larger proportional amount of nutrition than any other period of life, need a supplementary diet. It is during this adolescent period that a very marked increase in tuberculosis has been noted. As is well known, the most fulminating types of tuberculosis are likely to appear during the adolescent period and it is to meet this situation in the schools that it has been proposed in a report which was made to the school commission to extend the lunches. This is especially important for adolescent children in the upper form schools. The school population of Belgium for the lower form schools is approximately 885,000 children and during the last semester they have been given a supplementary school lunch provided by the Relief Organization. It has been determined if it is possible to get the necessary imports, to extend these school lunches to the upper form children from the beginning of the next semester on October 1st. This would probably include about 1,500,000 children in Belgium, or approximately the total needy school-children population and from 500,000 to 750,000 children in the north of France. It is especially important for the better development of the children and for the protection of the pre-tuberculous and tuberculous individuals who have to remain at home that there should be an increased diet, with special measures to overcome the present deficiencies in fat.

The estimate of the scientific organization of this commission as an example of the highest and best type of large social service work is not my own. It is also that of the government most interested from a blockade and efficiency standpoint, *i. e.*, Great Britain and likewise the nation which has advanced 2,500,000 monthly to the commission to further this work.

On an important public occasion in May last, Mr. Asquith then British Prime Minister, stated "that the practical problem of how to feed a nation suddenly confronted with the prospect of starvation and hemmed in by a hostile army pre-

sented unexampled difficulties. At the request of His Excellency, my friend Dr. Page, Mr. Hoover undertook the work and formed under the auspices of the American and Spanish diplomatic representatives what is now known as the Neutral Commission for Relief in Belgium. A noble friend and colleague of mine, Lord Curzon, has described Mr. Hoover's work as "a miracle of scientific organization." That, I believe, is not an over-statement. With the people in northern France which is occupied by Germany added to those in Belgium, Mr. Hoover and those associated with him have had to provide and are providing every day, food for over nine million persons, five million of whom are practically destitute.

MY LORD MAYOR:—The enormous volume of shipping and food supplies rendered necessary naturally brings the operations of the Neutral Commission under the closest supervision of the Admiralty and the War Office. I am glad to be in a position to say on behalf of those departments of His Majesty's government, that we are convinced that the relief food reaches the Belgians and the French and reaches them alone.

I am desired to express on behalf of the government our deep gratitude to Mr. Hoover and to those American citizens who have so nobly given up their time and their occupations without recompense, and to a large extent without recognition, to this work of purchasing, shipping and distributing the supplies which alone enables the population of Belgium to keep body and soul together. It is one of the finest achievements in the history of humane and philanthropic organization.

Prisoner of War Problem.—In contrast to the problem of Belgian relief the inspection of the prisoners of war in Germany entrusted to the care of the United States developed into a complex social service problem in an entirely different direction. At first this appeared to be purely a military inspection of large prison camps with a capacity of from 5,000 to 35,000 men each. While this represented a sufficiently large problem in itself when over 1,000,000 of these prisoners were sent to working camps and hired either to farmers, farmer contractors or large manufacturing concerns to work against their will, at the point of the bayonet, and where the housing, feeding etc., were left in the hands of the corporations whose interests were solely in the direction of securing productive results, the

problem became an intensely complicated one. The problem specifically was that of a survey of the industrial conditions employing over 1,000,000 men with a consideration of:

A. Nature of work. B. The place of work. C. The housing. D. Hygiene. E. Food. F. Health and morale of the men. G. The discipline and associated legal problems involved in the problem of work, refusal to work, conspiracy, etc.

Inasmuch as most of these matters were theoretically governed by the first Hague Conference, as far as the British were concerned, and by the second Hague Conference, as far as the other prisoners were concerned, a problem of international law was presented and an associated diplomatic problem in the correction of existing errors in any or all of the above directions as they were met with at the time of the survey. The problem was so large and the time of survey a matter of months that the problem of correction was applied simultaneously with the survey work. Without going into the situation in detail, on account of the time at my disposal, it may be said that in relation to the type of work, place of work, hours of work, compensation, etc., diplomatic problems were presented that added greatly to the complexity of the problem. This was also true in relation to the food supplied by the German government and also food packages sent in from England and Canada.

A problem of international law was presented in the settlement of questions where the German military law conflicted with the sense of justice of the prisoners of war in maintaining discipline, in enforcing the work, etc.

The problem of the correction of housing conditions, the health of the prisoner, his adaptation for unusual work, while a relatively simple matter of correction on the part of the military authorities, at times became a matter of diplomatic protest.

After the survey was completed eight attaches of the embassy were assigned in groups of two to the four most congested districts, with local headquarters at the seat of the army corps commander of the district working under a scheme of inspection of full records, the follow-up plan of reinspection

to cover adverse conditions and systematic periods of inspection at other times. It is quite impossible to go into the detail of this work except to call attention to the fact that it was based upon a complete systematic survey where all the problems were studied, and where the most effective remedy for each specific fault was worked out.

THE STRUGGLE FOR DEMOCRACY IN ANCIENT TIMES

By Albert J. Carnoy
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The great concern of a democratic nation is to imbue her citizens with the conviction that they are all dependent upon one another. This feeling of solidarity is at the basis of all the civic virtues. But while this is recognized by everybody, one easily overlooks the fact that, no less than with our contemporaries, we are in unbroken connection with the men that lived before us. The present political and economic situations, productive as they are of war or peace, sufferings or prosperity, the various ideals that inspire the men of our times, direct their efforts, as well as the present dissemination of man on earth and the characters of the races are the products of past conditions, of ancient evolutions and revolutions. It is therefore impossible to understand anything of the present world, unless one is acquainted with the development through the past ages of man in general and the present civilized nations in particular. There is no real knowledge, unless it be a knowledge of the causes. Moreover, since man is man and remains a man throughout the vicissitudes of the nations, the past events are interesting not only as a preparation to our present conditions, but also as being representative of what is likely to occur over and over again where there are men and communities of men. We men have a free will, but we use it generally to take the same decisions in the same circumstances.

All this applies to the history of Greece more than to any other. In that small country, during a short period of two centuries, we find a microcosm of civilization as well as a concentration of all the pursuits and all the struggles of civilized people in all times. In that memorable period was born what we might call the modern spirit, though we should rather call

it the Western spirit. Though the people of the East, of course, are not fundamentally different from those of the West, the evolution of civilization created in them very divergent mentalities. The Oriental likes to live in the constant consciousness that life is governed less by man's own efforts and direction than by powers superior to him, divine or wordly: The absorbing preoccupation is therefore to conciliate or master those powers. The Occidental, to be sure, does not ignore God and the law, but, more than in the East, his conduct is generally inspired by the persuasion that it is possible to improve the conditions of one's life by one's own effort. He is less inclined to take things as they are, simply because they are so. He wants to know why things are what they are and whether they could not be better. Hence a critical spirit, asserting itself in a greater aptitude for philosophy, science and practical inventions. Moreover, there is an effort for a better government and a greater participation in the government, while the Eastern people rather assume that power is a kind of emanation from Divinity which goes from one man to another by a sort of fate dominating human events. The Persian belief in a kingly splendor or prestige (hvarenah) transmitted from one dynasty to another when the times are accomplished is the concrete expression of what those people more or less feel. As is the case with all excesses, the exaggerations of both those mentalities would be equally disastrous: on one side, immobility and apathy, on the other demoralizing skepticism and social decomposition.

In conformity with those general tendencies, civilization in the East develops by the submission of an ever greater number of small patriarchal states to an ever stronger and more efficient power. Everything gravitates around the power. The military organization is foremost in the state. The acumen and ability, the industry and the resources of the subjects are commandeered by the kings to enhance their power. The gods who protect the kings are more absorbent yet. All the works of art are produced for temples and palaces. The tribute paid by subjected nations enables the kings to have more

splendor and a greater army. The necessity of collecting that money brings about the development of an administration. Roads are also provided to facilitate the transportation of troops to the remotest provinces where the people are only too prone to shake off the obligation of the tribute. The Persian empire is the heir of the Babylonian, Hittite and Assyrian empires, but it has given to the imperial idea its fullest realization. The system of the satrapies, of the imperial roads, of the royal mail, etc., has only been surpassed by the Romans. That empire also was the first to employ with discrimination all the subjected populations, using the maritime people for the fleet, other tribes for archery, other as spearmen, etc. All this, of course, is an organization in favor of the imperial people and the imperial dynasty. The imperial system as conceived in ancient times is not the government of the people by the people and for the people, but the utilization of the greatest possible portion of the world by the ruling element. The subjects in return for their tribute and their obedience only receive peace, order and protection from attack. That Eastern conception with the idea of the divine power of the emperor gradually invaded the Roman empire, and it is the same ideal of order, obedience and protection which was revived in Charlemagne's empire, of which the Holy Roman Empire of Central Europe in the Middle ages was the perpetuation.

Unfortunately, the Holy Roman Empire only imperfectly answered to the ideal and one has said that it was neither holy, nor Roman, nor even an empire. Since then, as is well known, both by Napoleon and by dynasties in our own times, the imperial idea has been brought even nearer to the ancient conception of a strong central power, order and prosperity allied with the domination of an ever greater number of people and a tendency to world-power.

While in Asia, the development of civilization was taking that aspect and producing that conception of order and power, there was developing in the West a directly opposed conception of man's progress and happiness. The starting point was the same. The city-state or more exactly the village-state was

too small to give to man a chance to display his full faculties and powers. The occasion for further development, here, however, was provided, not so generally by the conquest of neighboring states, but by the raising of several small towns into important, rich and powerful cities, through commerce, navigation and a beginning of industry. In that way, the city, the πόλις, increased, not so much by force and through the achievements of kings and generals as by the citizens' activity. The citizens' success involved the citizens' power. First, the wealth of the community was mainly for the benefit of a few families who also secured the influence and developed the oligarchic state, but the collaboration of middle classes and workmen in the production of wealth rather increased, and those classes gradually received the greatest part of power in the government. The conception of the state as a community in which every one is responsible to the whole body finds its expression in the citizens' army, in great contrast to the Asiatic conception of the military service as a "corvée" imposed by the kings.

Instead of the Oriental passive submission to traditions and dynasties, the Greeks give proofs of individualism, of independence of mind and of free observation in their very first manifestations of art, those of Mycenean times. The Oriental motives are treated with a striking expression of the artist's personality which is very rare in the East. It is thus a general tendency deeply rooted in the minds of those aggressive and individualistic people which constantly directed the Greek political evolution towards more freedom in the city, more consciousness in the citizens. This moreover was helped by the circumstance that the Greeks were living in a great many islands and peninsulas, which, of course, made those small states independent from one another and favored the development of individualism and commercial activity. Though the evolution thus was an unconscious one under the influence of a natural instinct and of circumstances, the Greeks were too intelligent to remain long unaware of the force that was turning their ancient small towns into finely organized states. Various

cities mention the names of legislators to whom their much-admired constitutions were ascribed. The philosophers gave a full extension to the theorizing of the conception of the city as an organism in which every organ had its function and its particular influence on the life of the whole. Such is Plato's Utopia, a city in which probably we would not eagerly wish to live, but which is hardly less attractive, however, than the modern dream-states presented to our imagination by various social reformers. They are, after all, experiments made by our intelligence in quest of a concrete form to represent the indefinite aspirations of our hearts towards a better life. Like all experiments, they cannot be successful at once. The Greek democratic state of the Athenian type also was an experiment, a practical experiment, and as such also it was likely to be a relative failure. There were two categories of dangers; the first were internal: the young democracy was suffering from its very juvenile ardor and was inclining towards demagogy; the others were external: the newly-born democracy in its cradle was indeed attacked by all the forces of the opposite ideal of civilization. The most dramatic incident of the conflict, no doubt, is the great assault of the Asiatic empire of Persia concentrating all its forces in an unprecedented display of military power against the small maritime state of the West. In that unequal conflict the parties appear to us very much as they are in the well-known fable of the lion who vainly tried to seize the fly on its nose, that was making it furiously mad. The rabid display of its forces, the flash in its eyes and the thunder of its voice were of no avail. Small, free maritime states are often like gadflies on the heads of imperial colossuses. Besides that general provocation, Persia was led to attack the Greeks of Europe on account of the aid which they had given to their fellow-Greeks of the Asiatic coast. Small democratic states, proud of the spirit of their men, are apt to underrate the magnitude of the resources of the empires which threaten their independence. So the Greek colonies of Asia, vassal of the great king, had rebelled and after a short series of successes had been crushed by a Persian army in spite of the assistance

given to them by the Greeks of the other side of the Aegean sea. To prevent the recurrence of such an alliance, Persia decided to subjugate all the Greeks. Her first expedition, which was not adequate to the circumstances, had been defeated in Marathon. Compared with the size of our modern battles, the glorious victory of Marathon takes the proportion of a mere skirmish and, in fact, even in ancient times it was hardly more. This, however, was not realized by the Athenians and, no doubt, it was their success in that encounter that made them so presumptuous as to defy the great king when, some years after, he came with all his forces. We see the facts at a long distance and we are apt to form an inadequate idea of the aspect they assumed in the eyes of the Greeks at that time. They certainly were not aware of the magnitude of the things that were at stake. Persian rule, though unwelcome to the Asiatic Greeks, had not radically changed the social and commercial life of the cities. On the other hand, the patriotic and national feeling of the Greeks was only nascent—patriotism also was a slowly developing novelty. The submission of Athens would have stopped the natural evolution of Greece towards democracy and prevented the brilliant and unique efflorescence of arts and sciences of the Periclean age. The Asiatic ideal would have extended to the West and the people of modern times would not have found in Greece the prototype of their democratic states. But nothing of the kind could be suspected by the men of that period.

Xerxes appeared to some Greeks as a welcome ally against the democrats. The realistic states of Boeotia, Thessaly, etc., which were representative of a feature of character very typical of the Greeks of all times outside the idealistic Athenians and the brave Spartans, thought that it was better to be a friend than a foe to a powerful neighbor. The proud feeling of duty on the part of Sparta and the love for freedom of Athens raised the men above circumstances and made them reject what more prudent people considered to be an able policy.

And the despot came, hurling an army, the size of which upset all the conceptions of the time about military possibili-

ties. The expedition was admirably planned and masterly prepared. It was perhaps the greatest effort of the kind in antiquity. Though we hardly can trust the Greek historian as to the size of the army, it is certain that it was formidable. The Persians wanted to strike a decisive blow and they believed in fighting in massed formations. The transportation of such a quantity of men so far from the center of the Persian empire even in modern times would be a serious problem. The troops were to be accompanied by a fleet protecting the communications. All along the road which the army had to follow stores of supplies were prepared that were to be renewed by using ships and big wagons. Shipyards were provided in all the harbors. Two bridges were built on the Hellespont and on the Strymon (the modern Struma) near Salonika, while the Athos peninsula was separated from the coast by a ship canal. There was in that superhuman display of power something so disconcerting for contemporaries that Xerxes was taxed with ὕβρις, "the folly of conceit and ambition," and also with impiety for having yoked the sacred river of Helle, the modern Dardanelles. The persuasion that the gods would not be indifferent to such an encroaching upon their power and that they would exert their νέμεσις, their vengeance, upon the ambitious autocrat did much to save the Greeks from discouragement, when they found themselves confronted with an army of which they never had suspected the immensity. Moreover, they had decided to defend their country and in presence of the enemy honor forbade any other course than fighting to the end. The great deed of the Spartans in Thermopylae, where, against terrible odds, three hundred of them with no other prospect than a glorious death defended that narrow pass, the entrance to Greece, could but reinforce that feeling of honor, and clearly showed to everybody his duty. The Athenians, in giving over their city and their temples to destruction at the hands of the invaders and in taking refuge in the island of Salamis, thought that they were making no greater sacrifice than the three hundred Spartans who had laid down their lives in the celebrated Thermopylae. And the day had come when the fate of Greece

would be decided. The huge Persian army could not subsist without the fleet and there lay the hopes of the Greeks. They were now appreciating the far-seeing patriotism of Themistocles who had provided Athens with an imposing navy. Though the Asiatic fleet was stronger, the odds on sea were not so great that a nation of daring sailors could not hope for victory if they could fight under favorable circumstances. The Greek historians tell us that Themistocles made use of a stratagem to induce the Persian fleet to attack the Greeks in the narrows between Salamis and Attica. If the Greeks were beaten no one could escape. They were literally locked in, since the Persians occupied both sides of the narrows. On the other hand, the Persian superiority in ships would be of no avail, since the sea was not broad enough to allow of any maneuver. The fighting was bound to be a series of boardings and hand-to-hand struggles. The account of the battle by Aeschylus is one of the most striking descriptions in Greek literature. It is a Persian fugitive who speaks: When Day drawn by white steeds had occupied the whole earth, of radiance beautiful to behold, first of all a shout from the Greeks greeted Echo like a song and Echo from the island-rock at the same instant shouted forth an inspiring cry; and terror fell on all the barbarians, balked of their purpose, for not as in flight were the Greeks then chanting the solemn Paean, but speeding on to the fight with gallant daring of soul. And the trumpet with its clang inflamed the whole line; and forthwith the collision of the dashing car, at the word of command they smote the roaring brine. And quickly were they conspicuous to view. The right wing well marshaled led on foremost in good order; and secondly, their whole force was coming forth against us, and we could at the same time hear a mighty shout: *Sons of the Greeks, on! Free your country, and free your children, your wives, the abodes too of the Gods of your fathers, and the tombs of your ancestors: Now is the conflict for them all!* And, sooth to say, a murmur in the Persian tongue met them from our lines, and no longer was it the moment to delay, but forthwith ship dashed her brazen prow at ship. And the Grecian

vessel commenced her engagement, and broke off the whole of the figure-head of a Phenician ship; and each commander severally directed his bark against another of the enemy's. At first, indeed, the torrent of the Persian armament bore up against them; but when the multitude of our ships were crowded in the strait, no assistance could be given to one another, but they were struck by their own brazen beaks, and were smashing their entire equipment of oars, and the Grecian vessels not without science were smiting them in a circle on all sides, and the hulls of our vessels were upturned, and the sea was no longer to behold, filled as it was with wrecks and the slaughter of men. The shores too and the rugged rocks were filled with the dead; and every ship as many as there ever were of the barbaric armament, was rowed in flight without order. But the Greeks kept striking, hacking us as it were tunnies, or any draught of fishes, with fragments of oars and splinters of wrecks; and wailing filled the ocean brine with shrieks, until the eye of murky night removed it.[1]

The victory on sea was a presage of the victory on land that soon followed. The communications were cut for the big army and only a small detachment could be maintained in Europe. Persia had learned to her cost that there can be no world-power without the command of the sea. The victory at Salamis gave a great prestige to Athens and from that time on she became more and more the leading state of Greece. Her democratic constitution was imitated by all her allies and her colonies. The extension to the various nations of Europe of the English liberal constitution, during the nineteenth century, forms a curious parallel to that political propagation. The fleet that had conquered Persia made Athens queen of the seas and the maritime states, willing or unwilling, joined the Athenian confederation. A great afflux of wealth and a good government under the energetic and clever leadership of the great citizen, Pericles, gave to the Athenian democracy an admirable opportunity to develop the finest efflorescence of civilization that the world has ever witnessed. There were, no doubt,

[1] Aeschylus, Persians, 386–428. Transl. Buckley.

some dark points in the Athenian type of republic, but as it was, it was a very interesting experiment inspired by a lofty ideal. That golden age, unfortunately, was of short duration. Democracy, like Cronos, swallows up its own children after a short time; leaders succeeded to leaders who more and more obtained the favors of the people by giving them not what they needed but what they wanted. In the meantime, a greater danger was dawning for democracy. The menace from Asia had disappeared, but there were forces of reaction even in Greece. The Spartans could not be indifferent to the sudden extension of the Athenian power. Not only their own supremacy but their political ideals were endangered. They represented the artistocratic state and in all the Greek cities the aristocrats were their allies. The struggle this time, one understands, was no more between two essentially different organizations, but between states in which the power was apportioned among all citizens and those where only the influential families ruled. The struggle between Sparta and Athens was a long one. It will suffice to say that the latter republic in spite of her superiority in resources finally was beaten on account of her blunders. Fortunately, in spite of the difference of ideal, the Spartans were quite as idealistic as the Athenians and they proved noble and generous towards their defeated rivals, through admiration for all that Athens had given to Greece. It was thus the second occasion in the history of Greece when moral forces prevailed over violence. Sparta thus spared Athens after the disaster of her fleet in the Aegos Potamos and soon after again when the Spartan king Pausanias, spurning the advices of the military party, represented by Lysander, introduced a compromise between the warring factions at Athens and thus made life possible again for Sparta's rival. This generous act was very impolitic and, together with the diminution of her citizens, led to Sparta's ruin, half a century later. Such acts however like the attainments of the Greek genius in Athens have made mankind richer and bestowed immortality upon Greece, while all the realistic states who for a time secured a great efficiency and a great power by their

military and political organization, after their fall have remained dead forever.

If the Athenian democracy had thus triumphantly repelled the attacks of autocracy and, at least, survived the aristocratic reaction, it had become very weak in presence of a third enemy, the most to be feared by a democracy: the danger resulting from the appropriation by an autocracy of the attainments reached by human mind in the productive atmosphere of a free state. These attainments are then turned into forces of destruction and subjection.

Greek genius and Greek civic virtues had created the phalanx or solid battalion moving as one man in the battle. Greek science had made it possible to improve war machinery. All this was borrowed by the Macedonians, who could ally those advantages with unity of command and a consistent policy, such as could not be dreamed of in Greece. The kings of Macedonia inherited from father to son the same program: to secure a place among the Greeks and if possible take their lead. Those less advanced people had naturally been attracted by the brilliant Greek civilization, which they envied and tried to imitate. They had to hellenize themselves, obtain their recognition as Greeks, penetrate the Greek leagues and impose their will there. Even a plan for a world-power was looming in the background of their ambitions: the expedition of Cyrus with the ten thousand Greeks had demonstrated that Greek tactics were, after all, superior to the Asiatic military methods. They thus set about training a strong and well disciplined army. They also undertook the task of securing good harbors and of increasing their revenues, above all, through the exploitation of the gold mines of Pangaeus. In spite of a great superiority of resources, Athens was seriously endangered by the rise of that new semi-barbarian power, because she was a democracy and more yet because she was a decadent democracy. There was a weakening of character and of ideals. The city was a prey to the orators, the politicians, the utopists and to a general selfishness. Speeches followed speeches and decrees, decrees. One dealt with inci-

dents, but nobody except Demosthenes was courageous enough to consider in its entirety a conflict that was assuming ever more dangerous proportions. The people were bent on receiving donations from the public treasury rather than on having that money spent for soldiers and equipments. It was thus impossible to persuade them to vote subsidies for that purpose, unless the danger was immediate. It is not surprising therefore that nobody heeded Demosthenes' solemn warning in his first speech against Philip. "If we do not fight Philip in Macedonia, we shall perhaps be compelled to fight him here." (Phil. I. 4. 50.) It would be tedious to enumerate here the minor episodes of that campaign between Philip and Athens. The superiority in resources of the Greek republic was wasted by mistakes of various kinds such as belated or insufficient interventions. Instead of going energetically to work, the Athenians spent their time trying to persuade themselves that Philip did not want war with them or airing in emphatic words their indignation at his breaches of treaties and his ruthless treatment of populations, friendly to Athens. There was in Athens what we in our times would call a party of peace at any price. At its head was Eubulos, a conservative statesman and a respectable personality, who, however, was surrounded by politicians whose pacificism was more or less suspicious, as, for instance, the orator Aeschines. Utopic schemes were receiving credit as, notably, a plan for uniting by persuasion all the Greeks together in a pan-hellenic alliance with a view to combining their forces against the barbarians. Isocrates spent ten years, so it is said, in constructing long and rhythmic sentences on that theme in his "Panegyric." Delegates were even sent to various states to carry out the plan, but their reports never came. From time to time, the news of a sudden bold stroke of Philip produced a sensation and a panic; the colonies of Euboea or Chalcidice had been seized. Thermopylae was occupied, Philip was in Boeotia ready to enter Attica, etc. Each time there was an outburst of patriotism, decisions were taken in great haste, generally too late. To be fair, however, we are bound to say that Athens was impeded

not only by her faults but also by her honesty. In a democracy, the power is responsible and though politics are not always quite edifying, there must, however, be at least an appearance of honor. An autocrat has not to mind the opinion of his subjects, at least in the same extent, so that while Athens was trying to keep her pledges, Philip was shamelessly breaking his promises and was preparing war while officially at peace with Athens. This absence of scruples allied with skill and perseverance in preparations and secrecy in plans made Philip's position stronger than could have been that of any Greek republic. Philip thought he never could have too many allies and insidiously was meddling with the affairs of all the Greek cities so as to create pro-Macedonian parties. Though devoid of any moral restraint himself, he was fully appreciating the value of moral factors. He wanted to have the gods on his side and to appear as the avenger of the violated temple of Delphi. It is in that quality indeed that he intervened in the sacred wars against the Phocians who had plundered the great national sanctuary of Apollo at Delphi. He also eagerly wished to be considered as the one who wanted peace. He therefore took care to send a reassuring and agreeable note to the Athenians just a few weeks before he took hold of Olynthus. His agents were telling the same tale on the Athenian market-place while he was plotting in Phocis and in the Peloponnesus. Hardly had he seized the colonies of Athens in Thrace when he sent a note with honeywords to Athens in which he deplored the misrepresentations of his enemies and protested that he had broken no promises. Besides that gentle manner of keeping the Athenians at peace, while he was preparing their enslavement he had a stronger one. When Olynthus fell, the destruction was complete and terrible. In opposition to all the customs in case of war between Greeks, the Olynthians were driven off to slavery and long troops of those unfortunates were seen along the roads of the Peloponnesus. Nothing could shock the feelings of the Greek world more than such a policy of frightfulness. In fact, however, in spite of the eloquent speeches of Demosthenes, these acts of Philip rather helped

him because in secret many Athenians preferred to live at peace with such a dangerous man than to undertake to fight him at the risk of being afflicted with a similar treatment. The money of Philip was another stupefying drug poured upon Athenian dignity. Many politicians were bribed. There was an active pro-Macedonian propaganda enervating the indignation and the mistrust of Athens in presence of Philip's policy. A quieting interpretation was being circulated for Philip's actions, it was whispered that he was a precious auxiliary of the Greeks and that his plans would prove very useful if only one let him execute them. Demosthenes and his party were decried as the advocates of a dangerous and anti-democratic policy. In the meantime, Philip's spies were active even within the walls of Athens. A certain Antiphon, a newly naturalized citizen, was arrested when attempting to burn the dockyards at the Piraeus so as to prevent the Athenians from building new ships. Even such a mean fellow could find a defender in Aeschines and the eloquence of Demosthenes was needed to have him put to death.

The protestations of good intentions on the part of Philip and his dubious policy were calculated so as to gain time. When he was ready, his agent Aeschines brought about an incident in the Amphictyonic council so as to render war unavoidable. Philip, at that moment, had seized in Thrace, in Thessaly and in Euboea all the points of vantage and even occupied Thermopylae by a bold stroke before war was declared. He had increased his resources by attacking and subduing various Balkan people of inferior civilization. The Scythians of the Danube in the Rumania of today were defeated and from their rich country Philip carried off a booty of 20,000 boys and women, much cattle and 20,000 horses. True it is, part of the booty was captured by the Triballi, a nation of bandits living in the present Albania. His strong and admirably disciplined army was made more efficient by the use of formidable war-machines. It is stated, for instance, that against the walls of Byzantium moving towers two hundred feet high were used. In presence of the Athenian unpreparedness it is even sur-

prising that Philip with such a power could not secure a more decisive success at once. The delay was due to Demosthenes' activity at the last hour. He was able to find continental allies for Athens, notably the Thebans, and to organize with the Athenian navy a blockade of Philip's coasts so as to make the supplying of his army very difficult. Athens, on the contrary, had at her disposal the inexhaustible crops of wheat of Southern Russia, because Byzantium, the present Constantinople, was her ally. Philip made a gigantic effort against this place, but in spite of his machinery, to which I have alluded, he received a check and his fleet had a narrow escape through the Dardanelles under the cover of night. It was on land that the war was to be decided. The Athenians, at first, won a few successes and a winter passed. The following summer, at Cheronea a decisive encounter took place. The superior discipline of the Macedonians prevailed upon the patriotism of the Athenians. The Greeks were driven back on both wings. A general flight ensued and the Greek forces were scattered so as to leave Athens at Philip's mercy. If he did not go immediately to the city and destroy it, it was due to his prudent policy. He did not want to alienate the sympathies of the Greeks whose command he was ambitious of securing. He knew that Athens would never recover from the stroke and henceforth would be his vassal under the cover of an alliance. It has been the fashion in recent years for a certain school of historians to deride Demosthenes' policy and to represent him as a foolhardy idealist, while Aeschines and those who were helping in the submission of Athens to Philip are praised as far-seeing and sensible people. But such views will not prevail upon the judgment of mankind. Demosthenes, though he may have thought too much of his country and his fellow-citizens, was a great man and a great citizen. It is a consolation for us to remember that his courageous voice was resounding while Greece and democracy were overcome by their own faults and by the plans of a shrewd and unscrupulous conqueror. Thanks to him, democracy in Greece had a noble death, it "mourut en beauté." It is the glory of democracy to create citizens

like Demosthenes, while absolutism in all times will be productive of characters like Philip. Demosthenes is not dead, Athens is not dead, democracy is not dead. The idea of a republic with political liberties has survived the empires of the Macedonians, of the Romans, of the Franks. It emerged again in the heart of the middle ages in the communes and more especially in those of Flanders. The medieval conception of the communes, of the guilds and of the corporations allied with remnants of the classical ideal of a republic found a realization in the confederation of the Flemish cities and later in the "Staaten" of the Low Countries, which are the prototype of the "States" in this new world of the West.

"Ex oriente lux," says a well-known phrase. Alas! the suns that have dawned from the East with all their glory, too often had a red gleam of blood behind them and often have made the atmosphere of our world heavier by the weight of their oppression. From the West the cyclones and the currents come. It is from here also that an irresistible current of ideas will force more justice, more freedom into the world in spite of all the tyrannies and all the conquerors.

RECENT DEVELOPMENTS IN ELECTRICAL APPARATUS

By Harold Pender

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Before proceeding with the discussion of some of the recent developments in electrical apparatus, I wish to point out that electrical engineering deals primarily with the applications of laws and principles which are as well understood, and often better understood, than the more familiar phenomena of mechanics. The inventive stage in electrical engineering has given place to the development stage. Progress in electric engineering during the last twenty years has been almost entirely in the improvement of apparatus and devices, and not in the discovery of new principles or in the invention of devices involving new principles.

A young man who may feel, after tinkering with electric bells, or possibly experimenting with a home wireless outfit, that he is destined to become a great electrical engineer, should not forget that before he can do anything really worth while he must first make himself reasonably familiar with what others have done before him. Electrical engineering, although the youngest of the engineering professions, has been developed by intensive application, and the standard technical school curriculum of four years, though it may seem long to the student, is hardly more than sufficient to ground him in the fundamentals.

With respect to the recent developments in electrical engineering, the most spectacular event of recent years is undoubtedly the radio transmission of speech from Washington to Honolulu, a distance of 4,900 miles, announcement of which was made in September, 1915. This event has even greater significance when it is remembered that electromagnetic waves spread out in all directions from the sending station, and that

in consequence, the speaker in Washington could have been heard at any point within a radius of 4,900 miles, had suitable receiving apparatus been at hand. A circle of such a radius covers about one-third the total surface of the globe. Consequently, it is now possible for one human voice to be heard simultaneously throughout one-third of the entire world.

There are many limitations to the practical application of this remarkable accomplishment, the most serious of which is that all radio communication is transmitted through a single medium. Aside from the interference which would be produced by simultaneous radio conversations from neighboring stations, there are also the serious atmospheric disturbances with which all radio communications must contend.

Selective tuning of radio-telephonic apparatus naturally suggests itself, but radio-telephony is much more limited in this respect than radio-telegraphy. A spoken word is made of a combination of audible frequencies ranging from about 40 periods per second to about 2,000 periods per second. Each of these frequencies must be faithfully reproduced in the electromagnetic wave, which means that the sending apparatus must be capable of sending out not only waves having a mean frequency of a given value, for example, 50,000 periods per second, but also must be capable of sending out with the same relative intensity waves having a frequency as low as 48,000 and as high as 52,000 periods per second. The receiving apparatus must also be equally sensitive to all frequencies within this range. In short, each radio-telephone conversation requires a "band" of frequencies in the radio spectrum, and this band must have a width of at least 4,000 on the frequency scale. As the available range of frequencies for radio-telephonic work is limited to from about 20,000 to 100,000 periods per second, it is evident that but a comparatively few non-interfering bands of frequency are available.

Preceding the announcement of transcontinental radio-telephony by less than a year, was the opening of the transcontinental wire line from New York to San Francisco. Though less spectacular than the long distance radio-telephony, this

accomplishment is of far greater practical importance. The transcontinental wire line is the result of steady improvement in design, particularly with respect to the use of loading coils and repeaters, and has been made commercially feasible by the superposition of phantom and physical circuits and in the simultaneous utilization of the line copper for telegraphy and telephony.

The loading coil is sufficiently well known not to require consideration here. Various types of repeaters have been tried, but the type that promises the best results is the three-filament vacuum tube, or "audion," due to deForrest.

The deForrest audion consists of three elements, a tantalum tungsten filament, a wire grid and a metal plate mounted in the order named in a glass bulb from which practically all the air has been exhausted. The filament is heated to incandescence by an electric current. The alternating pressure which is to be amplified is impressed between the filament and the grid, and the circuit in which the amplification is to be produced is connected, in series with a battery, between the filament and the plate. An amplification of fifty or more times may be produced by a single device of this kind, and the amplified electric pressure is an exact replica of that which is amplified.

The essentially new feature in the development of long distance wireless telephony is likewise a device similar to the audion. By connecting a number of such devices in "cascade," so that the total amplification is the product of the several amplifications, it is possible to send out into space several horse power of electric energy in the form of electromagnetic waves having the same frequency and wave form as the sound waves produced by speech.

The so-called "pliotron," developed by the General Electric Company, is an amplifier which operates on the same principle as the deForrest audion. The pliotron, however, is said to be much superior to the original deForrest audion, in that a much more perfect vacuum is established in the tube. The pressure in a pliotron is less than one-ten-thousandth of a millimeter of mercury.

An amplifier somewhat similar to the audion has also been developed from the mercury arc rectifier, and is said to be perfectly satisfactory as a telephone repeater.

An amplifier based on an entirely different principle is the magnetic amplifier developed by Alexanderson. In this device use is made of the fact that the magnetic permeability of iron varies with the magnetizing force to which the iron is subjected.

Turning now from the transmission of small amounts of energy over great distances, to the development of large amounts of energy within a small space, there has been a decided tendency in recent years toward the building of electric generators of larger and larger sizes. This development has gone hand-in-hand with development of steam turbines. Prior to 1903, practically all generators were driven by slow-speed reciprocating engines, and the largest generator at that time was rated at 5,000 kilowatts, or 6,700 horse-power. In their physical dimensions these were huge, being some sixty feet in diameter.

At the present time the steam turbine is used almost exclusively for large generating equipment. There are at present a number of machines having a rating of from 30,000 to 35,000 kilowatts, or from 40,000 to 47,000 horse-power. In spite of the increased power capacity of generators, the volume occupied by them, due to relatively high speeds, is less than that occupied by the old slow-speed units of 5,000 kilowatt capacity. During the year 1916 a 45,000 kilowatt unit was ordered, and quotations have been made on even larger units.

Some of the central station managers, however, feel that the tendency toward these large units is ill advised. The president of one of the largest central station companies has recently stated that no single unit in a plant should have a capacity greater than fifteen per cent of the total load on the plant. The reason for such a limitation is obvious, in that a breakdown in a unit which supplies a large percentage of the total load may leave the plant without sufficient machinery to supply the demand upon it. In fact, in one large central station there was recently an accident to a 30,000 kilowatt machine and, in dismantling this machine in order to make repairs, a second

unit of the same size was damaged, with the result that the station was crippled to such an extent that every available machine had to be so heavily overloaded, in order to supply the demand, that it was only by good fortune that some of these latter were not damaged.

A turbo-generator installation of particular interest at this time is that of the 32,000-ton battleship "California," recently rechristened the "New Mexico," which is now being built at the New York Navy Yard. Each of the four propelling shafts of this vessel is driven by a 7,500 horse-power, 4,000 volt, quarterphase, 25 cycle induction motor, wound so that it can be connected either for 24 or for 36 poles. Two bipolar generators provided the electric power for driving these motors.

During the past two years there have been several installations of geared turbines for driving both slow speed direct current generators and alternating generators. The use of high speed turbines for driving slow speed generators has been made possible by the development of reduction gears capable of giving a speed reduction in the ratio of 25 to 1, or even greater.

The use of water power for generating electric energy is always topic of interest to the layman. The layman's preconceived ideas on this point, however, are often absolutely wrong. His notion is that water power costs nothing; the water is there and all that one has to do is to utilize it.

It is in his failure to realize what must be done in order to utilize the flow of a stream, that the layman fails to take into account all the factors involved. In fact, the cost of the equipment required to render the power of a stream available is from three to five times the cost of that required for a steam plant of the same capacity. This means that the capital charges (interest, depreciation, taxes, etc.) on a water power plant may be from three to six times the capital charges on a steam plant. Inasmuch as the annual cost of coal for a steam plant may be not over twice the capital charges on that plant, the substitution of water for coal may not be, and often is not,

sufficient to make the total cost of power from water less than the cost from coal, although the water itself may cost nothing.

In fact, there has recently been completed at Tonawanda, N. Y., a steam plant which it is expected will be able to generate electricity from coal cheaper than it can be generated from water at Niagara Falls.

In connection with the development of water powers, it is of interest to note that in the last ten years there has been a decided increase in both the size and efficiency of water wheels. The record to date for a single runner wheel is a capacity of 31,000 horse-power and an efficiency of 92 per cent.

The increase in capacity of single transformers, though by no means so marked as the increase in the capacity of single generators, is also worthy of note. The development of the radiator-type case has rendered possible the construction of self-cooled transformers having a continuous rating as high as 8,000 kilowatts. There are at present under construction several three-phase units rated at 14,000 kilowatts each, for 150,000 volt service. The largest air-blast transformer ever built was completed in 1915, this transformer being a three-phase auto-transformer designed for a continuous output of 20,000 kilowatts at 14,000 volts on the high tension winding.

Transmission lines operating at 150,000 volts have now been in use for several years, and there seems at present no tendency to go to higher voltages. For testing purposes transformers have been built for pressures as high as 1,000,000 volts. Of particular interest is the 1,000,000 volt, 1,000 kilovolt-ampère, sixty-cycle testing transformer used for demonstrating purposes at the Panama-Pacific International Exposition at San Francisco. To develop the full rating of this transformer, namely, 1,000 kilovolt-ampères, a current of but one ampère is required in the high tension winding.

An interesting feature in the construction of high tension transformers and of other high tension apparatus is the insulation of the high tension leads where they pass through the containing tank. Two types of such high voltage bushings are in use, namely, the condenser type and the oil-filled or

compound field type. The oil-filled type is essentially a tube built of rings of solid insulating compound, this tube being filled with oil, the oil taking practically all of the electric stress. The condenser type is built up of concentric layers of metal foil and sheet insulation, the axial lengths of the successive metallic cylinders decreasing with the increase in the radii of these cylinders, so that the successive condensers formed by adjacent metallic layers have practically equal capacity.

For several years 240 miles has remained the maximum distance for "straight-away" power transmission. With the increase in the number of interconnections between systems, however, the actual distance covered by the connected links of a network now greatly exceeds the distance just mentioned. For example, one Southern network reaches practically from the Atlantic to the Mississippi, over a distance of roughly 1,000 miles. This network is fed with energy from a number of power houses, and energy is drawn from the network at many points. This condition makes operation comparatively easy and greatly simplifies the problems of regulation.

The voltage regulation of transmission lines by the use of synchronous condensers, or phase modifiers, has in recent years passed from theoretical speculation to practical application on a very considerable scale. A striking example of the use of synchronous condensers is in connection with the 150,000 volt, 240 mile line from Big Creek, California, to Los Angeles. The total generator capacity is 70,000 kilovolt ampères. The voltage at the load end is controlled by two synchronous condensers, each having a rating of 15,000 kilovolt ampères. This plant was erected in 1913. A more recent but somewhat smaller installation of synchronous condensers is in connection with the transmission line from Point DuBois to Winnipeg. The load on this transmission line is about 30,000 kilowatts, and to control the voltage two 6,000 kilovolt-ampère synchronous condensers have been installed.

The synchronous condenser is identical in construction with the synchronous motor. The name "synchronous condenser" has come into general use from the fact that it is possible by

over-exciting such a motor to make it take a leading current, as does an ordinary condenser. By connecting an over-excited synchronous motor at the end of a transmission line, it is possible to neutralize the lagging component of the currents taken by other devices connected at the end of this line, and therefore to make the total load at the end of the line have a power factor of unity. It is also possible by means of a synchronous condenser to compensate in whole or in part for any drop in voltage between the power house and the end of the line.

Since the introduction of suspension insulators there have been no radical changes in the design of transmission lines. For lines operating at voltages of 60,000 and upward, steel towers from fifty feet to seventy feet in height are almost invariably employed. These towers are usually spaced eight or ten to the mile. The conductors are usually spaced from six to twelve feet apart, depending upon the voltage. Both copper and aluminum are used for the conductors. The shortage of copper available for industrial purposes, produced by the European war, has during the last two years resulted in the use of iron wire on a number of less important lines, particularly in Europe. For city underground distribution there has been a marked increase in recent years in the voltage employed. Underground cables for 25,000 volts are now used in a number of installations, whereas ten years ago 13,000 volts was the maximum voltage for which underground cables could be commercially manufactured.

The aluminum lighting arrester, introduced about ten years ago, is now used on practically all high voltage lines, and has proved a most effective piece of protective apparatus. With the increase in normal line voltage, interference due to lightning has decreased, due to the fact that the margin of safety in the line insulators has correspondingly increased. With the increase in the generator capacity connected to a given line, however, internal surges of even more destructive force than lightning may be set up in the system, due to short circuits, arcing grounds, or even to ordinary switching operations.

As a protection against short circuits, power-limiting reactors are now generally installed on all large systems. Such a reactor may be placed between each generator and the bus-bars, between sections of the bus-bars, or in series with individual feeders.

As a protection against arcing grounds several types of arc suppressors have been installed. The essential principle of an arc suppressor is the momentary short-circuiting of any accidental arc (such as from line to ground over an insulator) by means of a metallic connection to ground, the duration of this metallic short circuit being just sufficient to permit the hot vapors formed by the arc to cool off and to dissipate. The cause which starts an arcing ground is itself usually of but brief duration, so that when the metallic ground connection is removed there is usually no tendency for the arc to re-establish itself. However, if no metallic connection is provided, the arc may continue and thereby set up in the system destructive high frequency high voltage oscillations, the energy required to maintain the arc coming from the generators connected to the line. Sufficient current may also flow through the arc to heat the insulator until it cracks, or to burn off the line conductor.

A question which naturally arises in the consideration of arcing grounds is why a ground through an arc is more likely to set up destructive oscillations than is a metallic ground. The answer to this question is that the voltage drop through an arc *decreases* with an increase of current through the arc. This is essentially an unstable condition, as is evidenced by the fact that a "ballast" consisting of a resistance or reactance must always be placed in series with an arc lamp to insure its stable operation.

A transmission line, due to its inductance and capacity, has a number of "free periods" of oscillation, depending upon its constants and the constants of the apparatus connected thereto. Any sudden change in the voltage or current at any point of the line sets up in the line and connected apparatus oscillations of frequencies corresponding to these free periods, but, due to the

resistance of the circuits in which these oscillations take place, they are rapidly damped out unless energy at these frequencies is continually supplied to the line. In the case of a metallic ground, there is no source from which these oscillations may derive energy, but in the case of an arcing ground, the arc, due to its instability, acts as such a source of high frequency energy. A useful application of this same phenomena is found in the Poulsen arc (used in radio work), which is essentially a direct current arc shunted by a circuit containing inductance and capacity. In the case of alternating currents, the arc goes out at the end of each half cycle of voltage, which effect breaks up the high frequency oscillations into separate trains of waves, but each separate train may contain many thousands of complete oscillations, due to the fact that these oscillations may have a frequency of several thousands or even hundreds of thousands of cycles per second.

The development of satisfactory sixty-cycle synchronous converters in relatively large sizes (up to 2,500 kilowatts) bids fair to lead to the general adoption of sixty-cycles per second as the standard frequency for power transmission, except in the case of the comparatively few systems devoted to the operation of alternating current railway motors. A striking example of the use of sixty-cycles, under conditions which a few years ago would undoubtedly have led to the adoption of twenty-five cycles, is the transmission system supplying power from the St. Lawrence to Messina Springs, N. Y. About 50,000 kilowatts is transmitted to a sub-station at the end of this line, where it is converted into direct current power for electrochemical purposes. The conversion is accomplished by means of eighteen 2,500 kilowatt sixty-cycle synchronous converters. Ten years ago the adoption of sixty cycles for such a system would necessarily have implied the use of motor generator sets, with an accompanying increase in cost and decrease in efficiency.

It is only within the last few years that the design of the sixty-cycle synchronous converter has been improved to such a point that this machine is now equally as satisfactory as

the twenty-five-cycle converter. The improvement in design consists mainly in the use of commutating poles, powerful damping grids in the pole faces, and in the protection of the commutator and its brush rigging against flashover.

The synchronous booster converter is another recent improvement in synchronous converter construction. This machine consists essentially of two separate elements in series; an ordinary synchronous converter between which and the alternating current supply mains is connected a synchronous generator. The fields of the two elements are entirely separate. Consequently, by varying the field of the generator element, the voltage impressed on the converter may be varied between any desired limits. By this means it is possible to vary the voltage on the direct current side between whatever limits may be desired. This feature is of particular importance in connection with railway work, where over-compounding on the direct-current side is often desirable. Other devices for accomplishing this same purpose, but giving a much smaller range in voltage, are the induction regulator, the split-pole converter and the external reactor.

The possibility of using mercury arc rectifier, as a means whereby the advantages of a high alternating voltage may be used for transmitting energy to trains, retaining, however, the advantage of direct current motors, has been seriously considered for a number of years. An experimental locomotive with glass bulb rectifiers was tried out some time ago, but the fragility of such bulbs is a serious drawback in practical operation. A locomotive equipped with four direct current moto and a 1,000 kilowatt steel cylinder mercury rectifier, was tried out last year on the New Canaan branch of the New Haven Railroad. This locomotive was operated for over a year with an average daily mileage of about 240. The results obtained give promise that this type of locomotive may find a large field of application.

For the rectification of small currents at high voltage, Fleming devised a number of years ago a vacuum tube device which is known as the Fleming valve. This device is similar in con-

struction to the deForrest audion referred to above, except that only two electrodes are used, the grid being omitted.

This device has recently been greatly improved both in details of construction and in the establishment of a much higher vacuum than used in the original Fleming valve. The improved device has been given the name "kenotron." This word is derived from two Greek words signifying "empty instrument."

The principle of operation of both the Fleming valve and the kenotron is that a metal filament, heated to incandescence in a vacuum or in a gas at very low pressure, gives off electrons which render the space around the filament conducting in one direction only. Hence, when an alternating voltage is applied between such a filament and the metal plate placed near it, an appreciable current will flow from the plate to the filament, but will not flow in the opposite direction.

A kenotron has been built capable of rectifying 250 milliampères at 180,000 volts (equivalent to 45 kilowatts) and there seems to be every reason to think that kenotrons could be used at very much higher voltages if desired. The potential drop through such a device is about 200 volts, so that its efficiency as a rectifier is very high. The device also has a positive volt-ampère characteristic, and therefore several kenotrons may be connected in parallel. In this respect the kenotron has a decided advantage over the mercury arc rectifier, which has a negative characteristic, which makes it impossible to operate two or more such rectifiers in parallel.

One of the most interesting developments of the last few years is that of the phase converter for transforming single phase alternating current energy into three-phase energy. This device has made possible the use of a high voltage single-phase trolley to supply energy to locomotives equipped with three-phase induction motors. The advantages of the high voltage single-phase control are well known and need not be discussed here. Three-phase induction motors for railway work have been tried out on several roads in Europe, and also in this country on the Cascade Division of the Great Northern

Railway. For heavy freight traffic over roads having large grades, the three-phase motor has proven entirely satisfactory. At first it was thought that the inherent constant speed of the three-phase motor would prove a disadvantage, but in such service this feature has actually proved a point decidedly in favor of this type of motor.

Until the development of the phase converter, the necessity for using two overhead trolleys to supply power to three-phase locomotives naturally discouraged the use of this type of locomotive. The importance of the phase converter is therefore that it is the link by which the advantages of the single-phase trolley and the three-phase motor may be combined.

The phase converter is in reality an extremely simple device. It is essentially a two-phase, squirrel cage, induction motor. One phase of the stator winding is connected directly across the single phase source of supply, and the motor is brought up to speed by some auxiliary device. As is well known, a polyphase motor, when brought up to speed, will operate satisfactorily when only one phase is supplied with energy. When thus operating, a voltage is induced in the second phase of the stator winding equal in value to the voltage impressed on the primary winding (when both windings have the same number of turns) but displaced in phase 90° from the voltage as in the primary winding. Any load connected across the second phase of the primary winding will therefore receive energy from the single phase supply circuit, but 90° out of phase with the energy supplied to the latter.

An important advantage in the use of three-phase induction motors for traction is that when such a motor attains a speed in excess of its synchronous or normal speed, it acts automatically as a generator and returns energy to the transmission line. A locomotive equipped with such motors therefore can not "run away," but just as soon as its speed exceeds the normal synchronous value, the transfer of energy to the line produces a retarding or braking force. By making use of this feature it is possible on the Norfolk and Western road to make two

electric freight trains going down one side of the mountain (about a four per cent grade) haul one train up the other side, and at the same time maintain the speed of all three trains approximately at the same value.

Regenerative braking can also be obtained with ordinary direct current motors, but requires more or less complicated arrangements for changing the interconnections between the various windings on the machine.

In the last few years there has been a continued trend toward the use of high direct current voltages for railway operation. There are at present more than fifty American railways either under construction or operating at a direct current voltage of 12,000 volts or higher. These include four 2,400 volt systems, one 3,000 volt main line electrification, one experimental road at 5,000 volts, and more than forty suburban and interurban systems operating at 1,200 and 1,500 volts.

The 3,000 volt main line electrification is that of the Western line of the Chicago, Milwaukee, and St. Paul Railroad, the electrification of one section of which (440 miles) has already been completed and is now in operation. The locomotives are constructed in two halves, the two halves together weighing 282 tons. The locomotive is equipped with eight motors, each having a one hour rating of 430 horse-power and a continuous rating of 375 horse-power, thus providing a total of 3,000 horse-power continuously. When running at maximum speed, 1,500 volts is impressed across each motor, two motors being connected in series across the line. The motors are designed for regenerative braking.

The 5,000 volt direct current experimental line is a twelve-mile branch line of the Michigan United Traction Company. The Westinghouse Electric and Manufacturing Company, co-operating with this company, has installed on this line a complete car equipment with four 1,000 horse-power, 2,400 volt motors. These motors are of the "twin-armature bipolar type." It is claimed that this type of motor permits the use of double the voltage on a given commutator that is possible with a four-pole motor, that it weighs but little

more than a corresponding four-pole motor, and that the two armatures being geared to the same axle act as one unit and cut the pressure on the gear teeth in half. The two armatures are connected in series so that there is 1,200 volts on each commutator.

High-voltage single phase supply for electric railways has been in use for several years on a number of lines. Two notable instances of single phase traction are the New York, New Haven and Hartford in the vicinity of New York, and the Pennsylvania in the vicinity of Philadelphia. The system of power generation in these two cases is radically different. The New Haven line is supplied from single-phase generators, whereas the single-phase power for the Pennsylvania line is supplied by three-phase generators operated in parallel with a new device, called a phase-balancer, which distributes this single-phase load equally among the three phases of the three-phase generators. Advantage is thus taken of the greater economy of the three-phase generator as compared with the single-phase generator.

In the above rapid review of the developments of electrical apparatus, only the high spots have been touched. There have been many minor developments of interest during the last few years which may ultimately lead to important improvements in the art.

No mention has been made of the developments in electric lamps. This has been covered by Professor Clewell in one of the earlier Saturday afternoon lectures of this year.

PRACTICAL USES OF THE X-RAY

By Henry K. Pancoast
Professor of Roentgenology

When we first began the use of the X-rays about fifteen years ago, or seven years after their discovery, it would have been quite possible to have given a discourse covering their entire application from the medical standpoint in a single hour. At the present time it is doubtful if the subject, "The Practical Uses of the Roentgen Ray," could be covered in a single day. This goes to show the great progress that has been made in the study of roentgenology during the past few years.

Before proceeding further it would be wise to define the terms that are employed in connection with the use of this form of energy. In the early days of X-ray work in Europe the use of the prefix "roentgen" was instituted in connection with all work referring to X-rays, and a few years ago this nomenclature was adopted by the American Medical Association and the American Roentgen Ray Society and is now in general use in all medical literature on the subject. This is not the case, however, in physics, the word X-ray being generally employed instead of the term roentgen ray. In the application of the prefix "roentgen" we now use the terms, roentgen ray, roentgen diagnosis, roentgen therapy for treatment, roentgenology to define the branch of medicine in which the rays are used, and roentgenologist to designate the individual who is a specialist in this work.

In their application to medicine and surgery, the roentgen rays have two distinct uses, first in treatment and secondly in diagnosis. The latter is the far more important application. In this short time it will be possible to cover only a small part of their uses in diagnosis, and their employment in roentgen therapy will have to be omitted entirely.

In order to better explain the uses of the roentgen rays and

X-rays are now known to be similar in their form and properties to light, both being wave forms through the ether. X-rays, however, represent far more rapidity and much shorter wave-lengths than the shortest waves of light.

The property of penetration of light and X-rays differs materially. The former will pass through ordinary glass readily, whereas X-rays will be obstructed to a certain extent. On the other hand, X-rays will pass through certain metals, such as aluminum, with ease, whereas light will not be permitted to pass through even the thinnest sheets of aluminum foil. As a rule the penetration of X-rays—or, looking at it in another way, the absorption of X-ray energy—is largely in proportion to the atomic weight of the substance through which the waves pass. Thus, aluminum, which has low atomic weight, readily permits the passage of the rays, whereas lead, which has a high atomic weight, tends to absorb them readily and does not permit their penetration to any great depth. In applying this principle to the use of X-rays in diagnosis, the denser portions of the body, such as bones, which are made up largely of calcium, tend to obstruct the waves, whereas the soft tissues which have very little inorganic matter in them, readily permit the rays to pass. Therefore, if we compare X-rays to light, the heavier structures cast dense shadows, whereas the soft tissues of the body produce shadows of little density.

Two methods are employed in the diagnostic application of roentgen rays, the use of the fluoroscope and of the photographic plate. It was known at the time of the discovery of X-rays that certain substances fluoresced or were made to give off light waves when exposed to X-ray energy. The most important of these substances are calcium tungstate and barium platino-cyanide. When either of these are spread over a surface, such as cardboard or celluloid, and exposed to the rays, the crystals become at once luminous, This is due to the transformation of X-ray energy into light waves. Naturally, any opaque object placed in the path of the rays will cause shadows upon the fluoroscopic screen. This method of examin-

ation is particularly applicable in connection with the study of moving parts of the body, such as, in the chest, the movements of the diaphragms, heart and great blood vessels; and in the case of the stomach, its movements in its efforts to expel its contents, known as peristalsis, can be easily observed. Certain abnormal conditions in the stomach interfere with this action and it is important to study the movements for this reason. We are able to manipulate various portions of the gastrointestinal tract and watch the manipulation under the fluoroscopic screen. This aids greatly in determining the movability of the various portions of the tract and the presence or absence of adhesions at certain points.

The discovery of X-rays was practically based upon the incident that photographic plates left in rather close proximity to an experimental Crookes tube in operation were materially affected by the exposure. This naturally led at once to the use of the rays with the photographic plates and at the present time this is by far their greatest application in diagnosis. The plate has many advantages over the fluoroscope, but especially because the danger of exposure to the person of the operator is eliminated, permanent records can be obtained, and clearer details observed. X-rays affect the silver salts in the plate in much the same manner as do light waves, and following the exposure the plate is developed along the same principles as the development of the ordinary photographic plate.

The first uses of roentgen diagnosis were in the detection of opaque foreign bodies and in the diagnosis of fractures and dislocations. Just at the present time, perhaps the most important use of roentgen diagnosis is the location of foreign bodies in warfare. The ability to readily detect the presence of foreign bodies and to locate them accurately has meant the saving of thousands of lives on the battlefields of Europe. At the beginning of the war the mortality among the wounded men was very high, but at the present time this has been reduced to a very small percentage, largely owing to the fact that foreign bodies could be readily located and removed soon after the wounds were inflicted. Plates are used to a considerable extent,

but the fluoroscope is so much more rapid and so easily handled, especially at the front, that the large majority of foreign bodies are located by this means and the use of plates is reserved for the more difficult cases which are sent back to the base hospitals.

Numerous methods have been devised for the exact location of foreign bodies in Europe and it is possible to describe only one or two of these at this time. It is not always possible to remove foreign bodies in the direction of the wound of entrance. The first procedure is to locate the position of the foreign body by means of the fluoroscope and then to determine the best avenue of approach for its removal. After this, a sharp needle or some other instrument is thrust through the tissues down to the foreign body under observation by the fluoroscopic screen. Another method is to introduce an instrument composed of two parts, one of which is called the cannula, and is a narrow cylindrical tube, and the other part, a trocar, is a sharp pointed rod, which is passed through the tube. Both are thrust through the tissues at the best avenue of approach until the foreign body is reached. The trocar is then removed and a piece of piano wire with a crook in the end is thrust through the cannula until it also reaches the foreign body. This then is given a twist to catch the crook at the end in the soft tissue, after which the cannula is removed and the patient is passed over to the surgeon who uses the wire, or, in case of the previous procedure, the needle, as a guide to finding the metallic object.

It is possible by means of special instruments devised for the purpose to locate a foreign body with exact precision. All such instruments depend upon the principle of the diagramatic reproduction of the central rays passing from the target of the tube to the shadow of the foreign body on the photographic plate. Two exposures must be made with the tube in two different positions. Where the reproduced lines of the central rays from the anode or target to the shadows made by them cross will be the exact location of the foreign body in the tissue. Special instruments have been devised for the location of foreign bodies in the eye and the precision with which this

can be done is remarkable. It is quite possible to obtain the location of a piece of metal in the eyeball to within a fraction of a millimeter in exactness. In the case of pieces of steel, this enables the surgeon to locate the foreign body exactly and then to introduce a magnet point near or at the position of the foreign body, and to extract it. Many eyes have been saved in this way because the extraction of foreign bodies without exact location is a very difficult procedure.

A number of lantern slides were shown to demonstrate some of the various diseases which can be diagnosed readily by means of the roentgen rays, as follows:

Boy referred for examination for supposed tuberculosis of the knee joint. The plates showed the presence of a piece of needle in the joint which was accountable for the symptoms.

Bone disease—a series of plates was shown to demonstrate the progress of acute inflammation in the bone of a child from its earliest stage to the point at which operation was indicated, and, subsequently, the plates showed the growth of a new bone following operation.

Disease of the jaw in a match worker.

Small abscess in the tibia, or large bone of the leg, near the ankle joint. The patient complained of pain in this region but there were no other signs to aid the surgeon in the diagnosis. The plates showed the exact condition present and the exact location of the small abscess, to aid him in the operation for reaching the abscess and draining it.

Tuberculosis—localized very small early focus of disease in the hip.

A more advanced case of tuberculous hip disease.

A small localized area just above the wrist.

A similar lesion just below the elbow.

A more advanced stage of tuberculous disease of the spine and the process of the development of the hump back was also demonstrated.

Spurs under the heel, a frequent cause of pain in the feet. This is due sometimes to gout but more often is a manifestation of a general rheumatic condition, so-called.

A malignant tumor of the forearm. The examination showed the nature of the disease and indicated that amputation was necessary.

A similar growth at an early stage in the arm in which a fracture had

occurred because of the presence of the growth. The latter would not have been discovered until too late except for the roentgen examination which indicated that amputation was necessary to save life.

A number of slides showing the various manifestations of gout and so-called rheumatic conditions of the joints.

Demonstration of disease of the alimentary canal:

Dilatation of the esophagus from spasmodic construction at the lower end.

A normal stomach showing the peristaltic waves which expel the food through the pylorus, or outlet.

A slightly dropped stomach which is the appearance usually found.

An extreme degree of ptosis or drop of the stomach.

The large intestine of the same case.

Dilatation of the stomach from obstruction at the pylorus, or outlet.

Various forms of ulcer of the stomach.

Ulcer of the duodenum just beyond the stomach.

Adhesions of the duodenum.

Cancer of the stomach.

The slides shown cover but a small part of the field of roentgen diagnosis. The remainder of the alimentary canal would require considerable time for discussion and the subject of fractures and dislocations and many other important conditions could not be taken up at this time.

PROBLEMS IN THE DEVELOPMENT OF UNITED STATES—SOUTH AMERICAN TRADE

By George B. Roorbach
Assistant Professor of Geography

The most absorbing topic in commercial circles during the past three years has been, unquestionably, the possible development of United States trade with South America. Magazines and newspapers have been filled with discussions of this subject; no meeting of business organizations has been complete unless "South America" appeared on the program; commercial agents and investigating committees have been sent to the southern continent in ever-increasing numbers, both by private firms and by the government; "Pan-American" conferences and congresses of many kinds have been held in both this country and in South American countries; Congress has debated the question and passed laws that might conceivably aid our commercial relations; the Department of Commerce has issued reports and bulletins giving information and advice and an almost bewildering number of books have been coming from the private publishing houses of the country telling Americans how to sell to Latin America. In fact, we have been having a veritable orgy of discussion on South America, almost ignoring the commercial possibilities of other parts of the world.

The reasons for this unusual interest in South America are apparent. In the first place, the need of developing a foreign market has only recently become imperative in this country. Our own expanding land has furnished the markets for our own manufacturers and absorbed the energies and thought of our business leaders. Now we are producing a surplus and are looking to potential markets beyond our borders. South America, with its large undeveloped area, sharing the same hemisphere with us, consisting of independent countries

with no political ties to Europe, naturally was one of the first sections of the world to attract our attention. Secondly, the building and completion of the Panama Canal gave an added impetus to our interest in South America. The common though unfounded belief that the opening of this canal would also open to us the whole continent of South America had at least the merit of starting a campaign of education in regard to our great southern neighbor. The third and probably the chief reason that has fired our interest has been the war in Europe. South America was shut off from her usual source of supplies in Europe by the outbreak of the war, and the markets for her exports were to a large extent destroyed. Here was the opportunity, many thought, to capture South American trade. Necessity placed the markets in our hands. Upon our own terms, South America has been forced to buy from the United States. That we have profited by the situation is shown in our increased share in the commerce with South America. In 1913 the imports from the United States into South America amounted to 16 per cent of the total imports; in 1915 the United States supplied 30 per cent of the total. In 1913 South America sent to the United States 17 per cent of her total exports, but in 1915 over 26 per cent came to the United States. In 1915 the United States led the nations of the world in value of importations into South America as a whole, and into each individual South American country except Argentina, Uruguay and Paraguay. The enthusiasts, however, have often neglected to notice that while the percentage of imports from the United States so rapidly increased, the actual value of goods sent to South America from the United States in 1915 was less than before the war. In 1913 South America imported from the United States to the value of $166,000,000 as compared to $158,000,000 in 1915. Our increase in imports was relative, not absolute. But even granting a decided improvement in the amount of our trade, is there a permanent basis for its maintenance and growth, or would effort better be expended elsewhere in building up our trade?

While some of the discussions concerning possible future commercial developments with South America have been sane and conservative, and occasionally even pessimistic, much that has been said and written has been born of desire rather than of fact; of hope, rather than of reason. Some of the most extravagant claims have been made, almost wholly ignoring facts. Often we are left to infer that the only reason we have not more of the South American trade is simply because we have not taken it; that all we have to do to get it is to go after it; that it is simply our own lack of energy and initiative that the South American market was not long

TABLE I.—IMPORTS AND EXPORTS HELD BY SOUTH AMERICA IN TRADE WITH THE UNITED STATES, 1911–1916.*

	Percentages of Total.					
	1911.	1912.	1913.	1914.	1915.	1916.
Exports to United States.....	20.68	20.60	17.65	25.83	26.69	30
Imports from United States.....	14.62	15.96	16.25	18.06	30.09	33
	Value in Millions of Dollars.					
Exports to United States.....	194.9	147.1	204.4	221.7	313.5	430
Imports from United States....	129.7	153.3	166.0	115.1	158.1	225

*The figures for 1916 are approximate only.

ago at our disposal. The blame for our holding third rather than first place in South American commerce is sometimes laid to the lack of an American merchant marine that would carry our wares to the Latin Americas; or to our poor financial connections; or to the absence, until very recently, of American banks; or our unwillingness to extend adequate credit facilities; and so on.

While there is force in these and similar reasons, they are superficial explanations rather than fundamental. The development of international trade is based upon no such simple principle as merely the perfection of the machinery of carrying on trade, as important as this may be. Trade is not a one-

sided affair, to be developed according to the whim or desire of one nation; it is a reciprocal affair. Its foundations rest upon the basic facts of geography and natural resources, modified and complicated by social, racial, political and historical factors. When we examine the possible trade relations between North and South America, we find that the problem is not a simple one. Along with certain advantages there are fundamental difficulties. It is my purpose this afternoon not to decry or condemn the efforts made to develop our trade relations with South America, but rather to point out, along with some of the favoring factors, a few of the underlying problems and difficulties that we face. Not to honestly and squarely recognize these problems is sure to lead to much misdirected and wasteful expenditure of effort, time and money by American business concerns, and to end in loss and disappointment.

I. *Accessibility.*—The first is the factor of accessibility. Many Americans hold the mistaken idea that South America is much more accessible to the United States than it is to Europe. Lying in the Western Hemisphere, the continent is thought of as a neighbor who, by virtue of proximity, should be doing the bulk of her trading with us. Furthermore, in the minds of many, the Panama Canal is regarded as having brought the continent still nearer. It is true that northern South America—Venezuela and Colombia—is much nearer to the chief seaports of the United States than it is to the leading harbors of Europe. It is also true that the Panama Canal is bringing the west coasts of Ecuador, Peru and northern Chile much nearer to the United States than they are to Europe. But a glance at the map will show us that those parts of South America which contain both the present and the future commercial prizes are essentially as near Europe as they are to the United States. The hot, tropical lands of the Amazon basin and the north coast contain but a meagre part of South America's population, and this part is largely Indian and in a very low plane of economic development. It is doubtful if this region ever can become the home of a large and rich

population. The west coast of South America, which the cutting of the Panama Canal has brought so much nearer to the United States, is, relatively speaking, a very small part of South America—say one-tenth, and a very poor tenth economically. The high Andes stand close to the Pacific shore, a barrier 6,000 miles long, from 10,000 to 20,000 feet high, shutting out access to the interior of the continent. The narrow ribbon of coastal plain at the base of the Andes is either a desert, incapable of ever supporting a large population, principally valuable at the present for its rapidly diminishing deposits of nitrates, or else a tropical jungle unhealthful and unattractive. The Andes themselves consist of high plateaus—often over 12,000 feet above the level of the sea—reached at great expense of time and money and effort from the coast. As valuable as the tin and copper, and gold and silver of these elevated plateaus may be, they cannot compare in value to the resources of the great plains of southern and eastern South America.

The South America of possible large population and of great economic and commercial potentialities lies south of the Amazon Basin and east of the Andes. The great agricultural and grazing lands of Argentina, Uruguay and Southern Brazil are not only now supplying the great bulk of South American commerce, but they will long continue to do so. Here will ultimately be a large and prosperous population, producing foods and raw materials for the outside world and creating markets for foreign wares. And this section of South America, reached only from the east coast, is as near Europe as it is near the United States. At the present time, because of the larger, faster boats employed in a more frequent steamship service, it is actually more accessible to Europe than to the United States. As far as accessibility to South America is concerned, the United States has practically no advantage over Europe.

II. *The United States as a Market for South American Products.*—The second problem I would mention is that of the United States' ability to buy in South America. Trade

is an interchange of commodities. Other things being equal, the securing of foreign markets by one country will be, to a considerable extent, dependent upon the degree that the country can buy the products of the land where it seeks markets. Buying establishes credits and other machinery by which trade is financed; it is to a large degree responsible for creating

TABLE II.—PRINCIPAL EXPORTS FROM SOUTH AMERICA, 1912.
(Approximate value in millions of dollars.)

Article.	Value.	Percentage of Total Export.	Value of Export to U. S.	Percentage of Each Exported to U. S.
Tropical Products:				
Coffee	259	22.1	112	43
Rubber	90.4	7.7	45	50
Cocoa	17.6	1.5	4.3	25
Cotton	10	.9	....	....
Grains:				
Corn	112	10	....	....
Oats and barley	21	1.7	....	....
Wheat and flour	112	10	....	....
Linseed	50	4.2	....	....
Animal Products:				
Wool	87	7.4	9	10
Hides and skins	81.8	7	20	25
Meats	53	4.5	....	....
Minerals:				
Nitrates	98	8.4	16.4	17
Tin	23	2	....	....
Other minerals	47	4	....	....
Total exports	1,170	100	242.5	20.6

adequate shipping facilities by which goods can be carried back cheaply as a return cargo to the market; it creates mutual dependence, which is a first aid to commerce.

What has South America to sell to the United States? Let us look, first, at the nature of the export trade of South America in 1913, the year preceding the great war.

The grains—including linseed, with corn, wheat, oats and barley—constitute the leading export of South America. In 1913 they made up over $295,000,000, 25 per cent of the total export trade of the continent. Coffee stands second, valued at $259,000,000, making up 22 per cent of the total; third is nitrates, valued at nearly $100,000,000, or 8.5 per cent of the total; fourth is rubber, $90,000,000, 7.7 per cent of the total; fifth is wool, valued at $87,000,000, or 7.4 per cent of the total; sixth is hides, valued at $81,000,000, 7 per cent of the whole; seventh is meats, valued at $53,000,000, 4.5 per cent of the total; followed by tin, valued at $23,000,000; copper, valued at $22,000,000; cocoa, valued at $17,500,000. These ten items make up 88 per cent of the exports. Maté cotton, sugar, quebracho, silver and gold make up the bulk of the remainder.

Of these leading exports, only three—coffee, rubber and cocoa—are tropical crops, and altogether make up considerably less than one-third of the total exports from South America, although the tropics constitute fully three-fourths of the total area. Furthermore, these three crops are all of small bulk relative to value and hence constitute much less than one-fourth of the total tonnage of trade from South America. Of these crops, most of the coffee (90 per cent) comes from a small area in the Southern Brazilian plateau where the climate approaches temperate conditions. If we exclude coffee, we see that the tropics today are responsible for only a small proportion of the South American trade. The United States is the leading market for these tropical products, more than 40 per cent of the coffee, 50 per cent of the rubber and 25 per cent of the cocoa coming to this country. Now, since these crops are all of relatively small bulk and require much smaller cargo space than their value indicates, although the United States is the leading purchaser of tropical products, they are crops that offer relatively small opportunity for sending as return cargo goods from the United States. This is one of the chief reasons why freight rates from the United States to South America are higher than they are from Europe.

Furthermore, the rubber and the cocoa come from sections of South America sparsely inhabited by undeveloped peoples of low buying power and of little progressiveness, and therefore offer but a poor market for the things the United States has to sell. Also of much significance, rubber production in Brazil is actually declining as the world supply comes in increasing quantities from the rubber plantations of the Far East. Rubber has been heretofore one of our strong commercial holds on the South American tropics, but it is now threatened by the competition of plantation rubber.

If we turn to temperate South America we find that this section is the principal source of South American exports. Corn, wheat, oats and linseed not only lead in value of exports, but they are exceedingly bulky, requiring at least ten times the tonnage to move them as to move coffee. In 1913, the value of Argentine exports of corn alone was 4,800,000 tons, as compared to 792,000 tons for Brazil's coffee export. The total grain and flour exports of Argentina was approximately 10,000,000 tons. The market for these bulky crops is almost entirely Europe; not the United States. Meats also are a bulky as well as valuable product that finds its market in Europe; and wool, while not bulky relative to its value, chiefly finds its way to Europe. The only temperate zone export of considerable importance that finds the United States market is hides and skins, but these again are of relatively small bulk and the United States takes but one-fourth of the South American export of this product. It is not surprising, therefore, that from the River Plate region most of the steamships are for European ports, that financial connections are well developed, that returning boats bring European goods; that freight from Hamburg and London and Liverpool are considerably less than they are from New York and Philadelphia, although these latter are a little nearer in actual mileage. Southern South America is primarily and permanently an agricultural and grazing land; it will be, for a long time at least, what it has been in the past, not a source of raw materials

for the United States but a competitor of the United States in European markets.

Turning now to the mineral exports, we note the dominance of nitrates. Although valued at less than half that of coffee, nitrates constitute three times the tonnage. In fact, nitrates have constituted the bulkiest single item of export from South America. An almost constant string of ships are coming to Chile for this valuable fertilizer, and five-sixth of these boats have come from Europe, the land of intensive farming, where fertilizer is greatly needed, bringing back chiefly European goods for the South American market. Likewise, tin from Bolivia has found its almost exclusive market in England, the center of the world tin market; copper only, of the minerals, has come to the United States in any considerable quantities. As in the case of the vegetable and animal products, the bulky minerals of South America find their natural and inevitable market in Europe.

The mineral resources of South America, however, hold the brightest hope for the future development of trade between the United States and South America. The exportations of tin ores from Bolivia and of iron ores from Chile direct to the United States have already begun and offer, along with our increasing importations of nitrates, much hope for our trade with the west coast. The American Smelting and Refining Company has just completed at Perth Amboy, N. J., a large tin smeltery, which will take 2,000 to 2,500 tons of ore per month. But the resource that holds out the greatest promise for our future commercial relations is the iron ore of Brazil. A short distance north of Rio Janeiro is one of the largest, if not the largest, known iron ore deposit in the world. In quantity and quality of its ore it is at least the equal of the superior ores of the United States. As soon as transportation facilities can be perfected, these ores will be exploited. Ore boats from Brazil will be frequent visitors to our Atlantic seaboard, giving bulk to traffic, as rubber and coffee now give value, and making possible a low freight rate on goods sent back on the return voyage to Brazil.

In spite of this hopeful feature, the American business man must remember that at present the natural market for the bulk of South American resources is in Europe, not in the United States. Our growing industrial population will undoubtedly require more of South American products in the future, but we can hardly expect, for a long time, at least, to be large buyers of such goods as grains and meats and cotton—bulky materials that will tend to keep South American export trade in European channels.

III. *South America as a Market for the United States.*—Let us turn now to the problem of selling United States productions to South America. What has the United States to sell to South America? An analysis of the import trade will show that not only has the continent imported most of its supplies from Europe, but Europe is the natural source of these supplies. In 1912 United States supplied 16 per cent of the imports, as against 63 per cent by England, Germany and France alone. The leading import is textiles. Here, naturally, England has the leadership, supplying 17 per cent of the total. Cotton goods alone make up 10 per cent of the total importations. No great promise is offered American manufacturers in supplying cotton textiles in competition with Europe. Furthermore, in Southern Brazil a textile industry of great promise has already begun, favored as it is by heavy tariffs and natural advantages of power and raw materials.

In the matter of foodstuffs, South American countries are either self-sufficient, or can readily be made so. In so far as they now import foods, it is largely from their neighbors in South America. Although the United States has been sending considerable wheat flour to Brazil, there is no large permanent market for American food exports into South America.

In the matter of raw materials for industry, also, South America is not a market for the United States. Coal is needed in large quantities, but it comes as a cheap ballast cargo from Europe. Timber is sent from the United States because of

the lack of commercial supplies in most of South America; petroleum products are likewise important, but the development of both the forest and the petroleum supplies of South America will enable that continent to supply increasing shares of her own needs in these items.

Iron and steel manufactures, including machinery, railway supplies, bridge and construction materials, would seem to offer the United States an outlet for goods it is especially able to supply to foreign countries. Being at the very beginning of its economic development, South America must import in increasing quantities such materials. Railroads are in course of construction, mines are being opened, water-power resources are being harnessed, new lands are being brought under cultivation—all these require vast quantities of machinery and other iron and steel manufactures. In some of these items the United States already has a conspicuous share of the trade, but the handicaps to its large development are serious. First, these goods are bulky, and, as we have seen, bulky cargoes from the United States to South America involve much higher freight rates than from Europe to South America. In the second place, most of the big public works of South America have been done and are being done by European firms with European capital. Naturally, these firms place their orders for supplies in Europe. In practically every country in South America the railroads have been built by Englishmen or with English capital; port works, telephone systems, sewage and water supply works, street car systems, new manufacturing establishments—nearly all the big works are European. American capital and American contracts—although in some cases important—are more often conspicuous by their absence. British investments are estimated at $3,850,000,000 as against $270,000,000 for the United States. The effect of this is illustrated by Argentina, which imported $10,000,000 in locomotives and railroad materials in 1912 from England, as compared to $1,000,000 from the United States. Both Germany and the United Kingdom surpassed the United States in machinery and hardware importations.

The difficulty of getting this market is plain, even granting our ability to produce in competition with Europe.

We should remember, furthermore, that the market for general manufactures in South America is relatively small. The total population of the continent is but 50,000,000. Of this population, less than one-fourth is white, the remaining three-fourths being Indian and negro or mixed Spanish and Indian. These latter are living in almost unbelievable poverty. Their purchasing power, as well as their producing power, is very low. That the population, especially of the temperate zone in South America, will grow and the standard of living increase, is undoubtedly true, but at present the buying power of the population, per capita, is low, and for possibly four-fifths of the continent a sparse population of low economic status is likely to prevail for many years to come.

That the United States has increased the value of her sales to South America since the outbreak of the war means nothing as to the future. We sold to South America because South America could not buy elsewhere. It has been through no efforts of our own, but rather in spite of our crude methods and lack of initiative, that we are today first in the Latin American market. When the war ends and the old-time conditions maintain, the tendency will again be for South America to look to Europe as the inevitable source of much of her supplies.

IV. *Social and Racial Prejudice.*—The problems we have thus far mentioned are based largely upon the character of the resources of South America as compared with the United States or Europe. Social prejudices and racial differences are a factor of scarcely less importance in estimating the possibilities of trade development. The South American and the North American are different; their tastes, their ideals, their outlook upon life are not the same, and the differences in many cases reaches the point of incompatibility. The brusque, blunt, direct methods of the Yankee grate upon the sensitive, courteous, proud Latin American; and the slowness, indirectness, always agreeable methods of the Latin

American exasperate the average North American, who looks for quick results. It is not necessarily a question of superiority or inferiority, but one of difference. The two peoples have little sympathy for each other. Of the peoples with whom he deals, the South American finds none so unwilling or so unable to adapt himself to South American ways as the North American; he dislikes him, he is suspicious of him. At the same time, the North American, the least adaptable of peoples, is unable to see the Latin American's point of view and treats him as an inferior. Intensely sensitive to slight or any assumption of superiority, it is not surprising that the Spanish-American should dislike the North American.

There has been little to remove and much to augment these differences between the North Americans and the South Americans. Naturally, there has been in the past little direct communication between the two peoples. With his racial affinities in Europe, carrying on the bulk of his trade with European countries, it has been but natural that the South American should travel in European countries when he leaves his own land, that he should send his children to Spanish, French or English schools, that he should take his styles in clothing, in art, in literature, in politics, from Europe. His tastes have therefore become European, and satisfied only by Europe. It is not surprising to find, in the clubs of South American cities, French, Spanish and English magazines and newspapers, but only an occasional American. It is not surprising that French is the language most often spoken and understood when other than Spanish and Portuguese is known.

The feeling of antipathy for the North American has been further strengthened by the fact that America has been very unfortunate in the men sent to represent her business concerns. Ignorant of South America and the South Americans, unacquainted with Spanish or Portuguese, unschooled in doing business with people outside their own borders, American commercial travelers have often shocked the Latin Americans with their boorish manners, unconcealed contempt for the people they visited and an overbearing and distasteful glori-

fication of the United States. There have been notable exceptions to this rule; but, compared with British, German or French commercial travelers, those from the United States have given a bad impression. The European nations, to whom a foreign market has been a vital necessity, have taken pains to please. The traveler has been coming for many years with a knowledge of the language of the people; he has made it a study to please and not to irritate, and has therefore helped to augment the sympathy of Latin America for Europeans and things European.

Can these differences and prejudices be overcome? Unquestionably, conscious attempts made by both peoples to dispell misunderstandings and ignorance can do much toward creating a better feeling. But the differences are more than superficial. They are based upon differences in race, in history, in religion, in long established customs, in political and social ideals. The gulf between the two peoples today is very wide. Its bridging, if ever it can be bridged, must be the result of much effort, long expended. It is not the work of a day or a year; it will require generations. Pan-Americanism is an ideal, probably worthy of the effort of its realization, but it is foolish to think the goal can be quickly or easily reached. In the meantime, these social and racial factors constitute a serious problem that our business men must recognize as they seek to develop trade relations with the continent to the South.

V. *Financial and Business Organisation.*—In discussions on South American-United States trade relations, the factors most often discussed are those connected with the lack of financial and other business organization on the part of the United States. The absence, until very recently, of any American banks; the small amount of American capital invested; the failure of United States firms to extend adequate credits; failure of Americans to conform to the demands of the South American market—these factors are constantly harped upon, generally with the implication that the fault all lies with short-sighted American business men. Without discounting the

force of these arguments, it is but fair to remember that these shortcomings are but a result of the natural or racial conditions already discussed, and not a fundamental cause of our commercial unpreparedness. When we consider that the United States is a nation economically youthful, only recently having a surplus either of manufactured goods for export or capital for investment, it is not surprising that British investments in South America should total $3,850,000,000 to our $270,000,000. With these large investments by Europeans, combined with the fact that the bulk of the national indebtedness of South American countries is also held (and naturally so) by Europeans, what should be more inevitable than that the machinery for financial transactions should be in European hands?

With the machinery for financing trade in European hands; with large sums of money payable to Europe in interest and dividends; with boards of directors of South American public and private enterprises sitting in Europe and seeing to it that supplies for their railroads or mines or public utilities are purchased in Europe; the flow of commerce has been continually augmented and encouraged between these two sections of the world. To overcome this is one of the important problems the American business man must solve. He has made a beginning by establishing banks; in sending more capital to South America, and in other ways, but long-established custom is not easily overcome, and especially is it difficult when nature aids custom in directing the current of trade.

In the matter of extending long-time credits, the American exporter is frequently charged with short-sightedness. But it must be remembered that European firms have been accustomed to giving credits of six months to a year because of necessity and because they could do it safely. Compared with American firms, European houses are willing to accept smaller returns. Necessity for foreign markets has made this inevitable. The American, accustomed to doing business on a cash basis and with large profits, or with nearby countries where quick returns are possible, has never formed the habit of giving long credits. Furthermore, in South America where

the American has but small means of obtaining credit information it would be unsafe. The European, with his many banks, and long-established business houses in every section of the continent can get reliable information that enables him safely to give these credits.

The American business man is greatly handicapped in comparison to the German and the Englishman because of the lack of business organization. For many years, these European countries have had their representatives in South America and have established in nearly all the commercial cities business houses that have perfected a wonderful organization for acquiring and promoting trade. The Germans especially have been successful in establishing these commercial centers. In many ports and cities of South America, the most conspicuous buildings are often the German commercial houses. Manned by a corps of trained Germans, many of whom have spent years in South America, these houses not only act as selling and buying agents, but as banks for local as well as for foreign business and as clearing houses of information for German concerns. Their organization extends into the interior of the countries, they keep themselves acquainted with the business of their competitors. Nor are the Germans allowing the wonderful system they have built up to be destroyed by the war. They are keeping themselves going the best they may, and when the war is ended their organization will be perfect and complete. Built up by years of careful work, such establishments have an enormous influence. Unless the American exporter seeks as carefully to organize his business, he will find it difficult if not impossible to obtain or keep the share of South American market he desires.

VI. *Methods of Doing Business.*—The last topic time will permit our discussing is the difficulty experienced by North Americans in adapting their ways to South American methods of doing business.

First, let us hasten to acknowledge that American business methods in dealing with South America have been far from being above reproach. Careless, tricky and fraudulent prac-

tices by Americans have been serious retarding influences. So recently as last July, the Union Industrial Argentina—a leading association of Argentine business men—had occasion to protest to the American Consul General in Buenos Aires against the failure of United States firms to live up to contracts. Instances were reported of the substitution of inferior goods for orders paid cash in advance; of cancellation of contracts, and so on. While in many instances the faults can be laid to ignorance or carelessness, there are all too many cases of deliberate fraud. Because of the feeling that United States merchants cannot be depended upon to fill orders as specified, or because it is known that they frequently will cancel orders, often to the great embarrassment of the South American importer, many firms in Latin America have refused to do business with North American firms. Compared with German or English houses, it must be acknowledged that United States houses have a not enviable reputation. It will take a long time to convince the South American that the United States business man is as dependable as the English.

On the other hand, many a United States firm has attempted to get into the South American market and given up in disgust when he has become acquainted with the red tape he must often go through if he would get business. It is not simply that the business methods of the Latin American and the North American are different, but the government restrictions and regulations that surround business are handicaps many United States firms find it difficult to endure. One of the many discouraging features is the complicated tariff systems of South American countries. Each country has its own peculiar tariff system, surrounded by a complicated code of rules and regulations. Tariffs are by weight rather than by value, with no allowance made for packing and no distinction for quality or value of goods in any classification. For example, the same duty is charged on a 100-pound box of cheap shoes as upon a similar weight of expensive shoes; a $250 piano will pay the same duty, if weight is the same, as a $1,000 piano. Tariff classifications are often extremely complicated, some

slight change in warp of a textile or the material used in a piece of furniture throwing the object from a lower to a higher classification. In addition to the regular scheduled tariffs, there are often extra duties of various kinds that the unwary will not discover until his goods have reached the custom house. For example, in Venezuela, in addition to the high scheduled rates, a 30 per cent surcharge is added to the original duty for paying the public debt; 12½ per cent for a national tax; 12½ per cent more for a territorial tax. These are all added to the regular duties and to all a 1 per cent sanitary tax is affixed, and if the goods have come into the country through West Indian ports, 30 per cent is added.

The amount of red-tape surrounding the administration of the customs is an almost hopeless tangle, even for the expert. Fines are imposed for slight and unintentional errors, such as misspelled words in the invoice, the use of "ditto" marks, ink blots, failure to state the nationality of the ship, or to name the captain of the boat on which the goods came. Then, there is often a long list of fees for lighterage, use of custom house, wharf dues, stamp taxes, etc. When all are paid, the tax often amounts to more than the original scheduled duty.

While these complicated rules apply to all nations alike, they work especially against the United States, because, first, we have not the commercial agents in the country who can make a careful study of all such regulations, and secondly, because the average American has no patience with such red-tape and will not take the time or the energy to unravel it. The German, for example, will know all the intricacies of these regulations for every port and will adapt his goods and his prices to meet them.

Another problem in establishing business in South America is connected with the method of granting concessions. To establish an enterprise it is generally necessary to get from the government a concession. These concessions may be for opening a mining enterprise, for establishing a factory for manufacturing certain articles, for marketing certain goods, etc. To obtain these concessions, long bickerings and very

often questionable methods must be employed. Rich concessions are awarded very often only to those who can bring the greatest influence to bear upon public officials. These must be liberally recompensed. The extent to which graft is practised among the small cliques that control the political affairs of many South American countries if known is a surprise even to Americans. The "squaring" of officials is regarded by some foreign firms as one of the legitimate items of expense. An English railroad company issued its common stock for free distribution to political leaders and officials in return for favors granted. The business house that is seeking to establish an enterprise in South America should know of these conditions beforehand. Failures have resulted because they were not known. Many business men would not have made the attempt in the first place had they been cognizant of the facts. What has just been said will not apply in equal force to all South America, but it does apply to many sections.

Conclusion.—We have tried to show that the development of United States-South American trade is not without its serious problems. The present leadership we hold is due to the conditions arising out of the war in Europe. While the commercial potentialities of the continent are large, we must remember that a large proportion—fully three-fourths—of the area is tropical, and its development is contingent upon the solution of the great problem of the development of tropic lands. The portions of the continent capable of supporting the largest and most progressive population and of furnishing the largest opportunities for commerce are in the south and eastern parts, and they are essentially as accessible to Europe as to the United States. A large bulk of the products of these sections, which today constitutes the largest tonnage and value of South American exports, finds its natural market in Europe. By reason of this, and because Europe is further advanced industrially than the United States, it is inevitable that importations into South America should find their principal source in Europe. The people of South America, by the ties of race, custom and ideals as well as of commercial rela-

tions, are bound to Europe rather than to the United States. In fact, there is a decided feeling of antipathy between the North American and Latin American, which does not exist between the European and the Latin-American. This feeling is a decided handicap to the development of commerce. In addition to these fundamental problems, there exists but little machinery in the way of financial and business organization for conducting trade between the two groups of peoples, and the creation of this machinery is made more difficult because of the essential differences in their methods of doing business. Such difficulties, however, time and effort might be able ultimately to overcome. But the fundamental factors of markets, resources and peoples makes the problem one of no little difficulty. That a large and increasing trade between the United States and South America will develop seems certain; that the United States can dominate that trade is not so certain; at best, the way is set with many difficulties that will require time, effort, tact and statesmanship to overcome.

THE EVOLUTION OF THE TEACHER

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It may well be said that the history of civilization is the story of the evolution of the teacher. The school and the teacher are distinctly products of civilization and are absolutely essential factors in all social progress. While I shall not here attempt to recount this story in all its details, I wish to point out in a very incomplete way some steps in this development. There are many gaps in the pictured story; we can at best only trace the outline, but even thus it contains much that has significance for us today, that sheds light upon present day problems in education.

It is a far cry from a magnificent educational institution like our own, with its beautiful and commodious dormitories, its splendid equipment in laboratories, apparatus and library facilities, a part of whose function is the professional training of teachers, back to the primitive condition, the old Indian woman fashioning the rude pot, and the young girl by her side watching. The connection is, however, by no means obscure. If, as we have heard, the three factors essential to a liberal education are a log, Mark Hopkins, and a student, we have, even in this picture of primitive occupation, all the factors necessary, in essence, to such an education. "But," you say, "this does not take into account personality, inspiration: Mark Hopkins is the really essential factor." Very true; but who shall say that this girl is not receiving inspiration just as truly from watching what to her may well be a wonderful operation, as the aspiring artist in watching a Raphael or as the interne in watching the skilful manipulation of the great surgeon.

In this sketch, I shall try to keep before you as we go three main points which are of vital importance in the development

of teaching, in the evolution of the teacher: (1) The relation of the teacher to the process of instruction—method; (2) The social status of the teacher; (3) The professional training of the teacher.

The first teaching, if we can call it such, was pure imitation. Little if any attempt was made at explanation. Here was something that was necessary for the child to know. At first there was not even any attempt made to force the child to learn, he merely "picked it up." Later, at the dawn of civilization, the primitive teacher merely said, "watch me, then do it." There is little that we could call real teaching here, but pure imitation. Imitation was and always has been used in education, and it probably always will be used; it is a constant factor in method. We all use it every day; it is founded upon one of those fundamental instincts which we share with the higher animals. For many things it is still the most economical method. In teaching writing we say, "Hold the pen this way;" in reading, "Hold the book this way." We use it in athletics, in gymnastics, in dancing. The chief point of difference between the primitive use of imitation as a method and our own is that among savages it is the only method; with us it is subordinated and used, we hope, intelligently when and where it is most effective. The old Indian woman making the piece of pottery is merely allowing the girl to observe with no attempt to teach her; later she may give more direct help to the girl, but it probably will be in the way of criticism of the product. "No, that is bad; do it again." This is not so strikingly unlike the method used by Agassiz, as reported by David Starr Jordan. When Dr. Jordan began his work with Agassiz he was given a fish and told to study it carefully and when he was ready he could report. Dr. Jordan studied the fish for a few hours and then reported. All Agassiz said was, "You know nothing about it, study it again." Again he spent days in the study and reported, with the same result. Finally, after months of study he was able to satisfy his teacher. There is no denying the fact that this method as well as that of the old Indian woman has elements of strength, but it also has elements of weakness, of wastefulness.

While practically all the things directly connected with food, clothing and shelter among the primitive peoples were taught by imitation, the initiatory ceremonies show a slight modification. These ceremonies which were attendant upon the formal step from boyhood to manhood were very important educationally. Each tribe had its secrets, its totems, its special spirits; a knowledge of these was essential to the well-being of the tribe. This knowledge was preserved, often enlarged, and handed down from uncle to nephew, for the office was hereditary as opposed to that of the war chief, which was elective. Matters of common tribal knowledge, as traditions and stories, had been told to the child by the mother or grandmother around the campfire or in the wigwam. But there were secrets known only to the adults and when the boy became old enough to take his place as an adult the stories were told to him. The special point of method was this: the ceremonies were preceded and accompanied by fasting, by torture and by mutilations, and all sorts of ceremonies so that the emotional aspect was heightened. As a result, the secrets were more firmly impressed and their value enhanced.

These ceremonies connected with initiation into the tribe we may properly regard as higher education. We must throughout this sketch distinguish between the higher teacher and the lower in social status, in method and in training. In nearly every case the medicine man was held in high regard on account of his supposed power over the spirits and his knowledge of the secrets of the tribe. There was then a distinct difference between the status of the higher teacher, the medicine man, and the elementary teacher, the mother.

Possibly nowhere in ancient times can the general status and position of teachers of different kinds be brought out more clearly than in the case of the Athenians. The elementary schools were private schools and were of two general kinds—the music school in which reading, writing and playing a simple musical instrument were taught, and the gymnastic school. The method in both of these was for the most part pure imitation. Learning to write consisted in copying the words written by

the teacher; in reading the boy merely repeated the words spoken to him; in music the same method was used, as well as in all the gymnastic exercises. Each boy had his pedagogue or servant whose special duty it was to look after the boy's conduct on the way to and from school and also in the school. He was a slave and was looked upon as such. The elementary school teachers usually taught for pay and were, for the most part, regarded as little higher than the pedagogue. So far as we know, the teacher of gymnastics was about on a par socially with the other elementary teacher, the music teacher. As in all ages, industrial training was given by imitation. The further education of the boy of the upper class was, up to the time of Pericles, given in the gymnasium, a public institution where more extensive athletic and gymnastic exercises were indulged in and was further advanced by attendance at the theaters, the assemblies, the law courts and other civic functions; also by observation and conversation in the market place. Hence, it was purely that of the apprentice. A little later there came an increasing demand for definite training in debate and public speaking. To supply this demand men skilled in such things came in, at first mostly from the provinces. These men gradually began to give definite instruction in those things that made for success in civic life. These were the sophists and may be considered the higher teachers. The conservatives claimed to despise these men not because they taught nor because they were skilled but because they received pay. By the young men, the radicals, they were highly esteemed, partly because they could give them what they wanted; partly, perhaps mostly, because they were skilled and learned in many ways. We have then this condition clearly shown which was true for hundreds of years; the teacher of the elementary school was despised, of the higher branches honored. But let it be remembered that he was honored not because he was a *teacher* but because he *knew so much*, especially about what the young man cared to know.

Of teaching method, there probably was very little. It still was mostly blind imitation of living models. Socrates, him-

self a sophist, was one of the first to begin real teaching in his so-called inductive method. This had very little effect upon school room practice for many centuries. While a notable advance over mere imitation, it was a wasteful process at best, and suffers very much when compared with the method of development used by our modern up-to-date, trained elementary teachers. The Athenians were still centuries away from the time when teachers received any definite training for their work.

The Roman schools show practically the same situation so far as teachers are concerned. There was the elementary teacher—the ludi-magister—whose station was low, whose method was memoriter, whose badge a rod. There were also various types of secondary schools, the Greek grammar school and the Latin grammar school. There was the school of the rhetor where young men were trained in public speaking. The status of the ludi-magister was not materially different from that of the elementary teacher in Athens and his methods much the same. The chief stimulus to learning was the rod which was used for failures in reading and writing as well as for poor deportment.

With regard to the social status of the teacher, Rome made a distinct advance in its attitude toward the higher teacher. Quintilian was a teacher and occupied a very high place, but he was what we would call a university professor and honored more for what he knew than for his teaching ability. From the time of Quintilian nearly to the fall of Rome, a certain class of teachers, the rhetors, were more highly honored than were teachers at any other time among the Romans. Secondary and higher schools supported by municipalities or by the emperor were common in Italy and especially in the provinces. The salaries of many teachers were paid by the emperor or by the municipalities. Gratian paid the salaries of grammarians and rhetoricians in each of the seventeen capitols. They were exempt from taxes and from military service. Theodosius raised the most distinguished rhetoricians to the rank of count. Here again it seems practically certain that these honors were given not because of their ability as teachers but because of

their accomplishments as rhetoricians and as learned men. This is borne out by the method used in training and choosing teachers. Under Marcus Aurelius appointment was made to the position of rhetor only after a strict examination, an important part of which was the delivery of a sample oration.

But with the fall of the empire the glory of the rhetorician departed. Medieval times saw no development of the elementary teacher and little of the secondary teacher. The schools and the teachers were almost entirely confined to the church. Men were honored for their piety or for what they knew. When Charlemagne called Alcuin from the cathedral school of York to reorganize education in his empire, he called him and honored him because of his learning. What development in method and improvement in social status there was, was seen almost entirely in the universities which were established during this time or later. The common method of the university professor was very similar to the modern lecture plan and was and is largely memoriter or imitation. There were some distinct steps taken in the improvements of method, but these were concerned largely with making the work of memorization easier and with the simplification of Latin grammar. The disputation, however, may be considered a distinct step in advance, but this also soon became purely imitative.

The status of the professor was unusually high, but again it was because of what he knew. Little if any training was required, professional training. Those who wished to become professors in universities must take the regular work and pass through the stages of preparation as in any other apprenticeship plans, *i. e.*, apprentice, journeyman, master. When he had received this training he could become a teacher. When examinations were given they tested knowledge, not teaching ability. This training for teaching was strictly comparable in some respects to that of the carpenter. In each the master workman did little if any instructing. It was purely imitation of the master by the apprentice. In one important respect the training of the apprentice in carpentry was distinctly superior to

that of the teacher. He, the apprentice carpenter, was all the time doing carpentry work while the apprentice teacher was not teaching at all but listening to the lectures of the professor and taking notes, with no opportunity to practice. Such a condition still largely obtains in our colleges, sad to relate. One important exception should be noted with regard to the training of the teacher in the fifteenth and sixteenth centuries. It was, as has been stated, for the most part formal and imitative, but the grammar school master, before he received the master's degree which would entitle him to teach, must pass a public examination in what to them was a very practical operation. What this test was is shown in the following quotation:

> Then shall the Bedell purvay for every master in Grammar a shrewde Boy, whom the master in Grammar shall bete openly in the Scolys, and the master in Grammar shall give the Boye a Grote for hys Labour, and another Grote to hym that provydeth the Rode and the Palmer, etc., de singulis.[1]

It is significant that the only thoroughly practical part of the requirement for this teaching position was the ability to flog—something which was necessary because of the lack of proper methods of teaching.

In spite of sporadic instances of real teaching of modern schools such as that of Vittorino da Feltre and his court school at Mantua, this general condition persisted through the Renaissance and also in Northern Europe during the Reformation, as evidenced by the description of schools of the time. There were quite a number of attempts to devise new and shorter methods of learning Latin such as those of Ratich and Comenius. These, for the most part, had to do largely or entirely with arrangement of subject matter or with schemes for memorization of subject matter, they were not concerned with the development of the pupil and had little connection with interest as a means. Indeed it would not be beyond the truth to say that so far as school-room practice is concerned,

[1] Dean Peacock—Observations on the Statutes of the University of Cambridge. Appendix A, p. 37.

the old idea of the teacher and method of instruction persisted well into the nineteenth century and has by no means yet disappeared.

Disregarding any development of educational practice in Europe, where, especially in Germany, the teaching profession, as a profession, has reached its highest development, let us consider some steps in the development of the teacher in our country. Here again we must clearly distinguish between the three types of teachers: the elementary, the secondary and the college or university. The first teachers in the colonies were masters of Latin grammar schools and college professors. They were both held in high esteem. The grammar masters were next to the ministers in social standing; the college professor the equal or superior of the minister. The method used by each was memoriter and no specific training for teaching was necessary, except that in early colonial days the teacher of the grammar school was supposed to be a college graduate. He was usually exempted from military service and often from special taxes. The elementary teacher, when there was one, was distinctly of a lower grade and the primary teacher or teacher of the dame school lower still. The methods used by all were practically the same. In Pennsylvania, as late as the second half of the eighteenth century, the elementary teachers were frequently indentured servants and had a very low place. Even the status of the grammar school master in Massachusetts steadily declined during the latter half of the seventeenth and nearly all of the eighteenth centuries.

We see, then, at the beginning of the nineteenth century this condition in America:

1. Little attempt at the specific training of teachers was made.
2. Method, so far as there was any, was concerned with organization of subject matter and memory devices.
3. The social status (*a*) of the college professor was usually high but he was regarded as a theorist; (*b*) that of the secondary teacher decidedly lower and getting worse;

(*c*) that of the elementary teacher very low comparatively.

4. This difference in social status was directly correlated not with teaching ability but with amount of education, of schooling, of knowledge.

For illustrations of the beginning of modern method, the later stages in the evolution of the teacher, we do not look to the college professor nor yet to the secondary teacher, but to the lowly elementary teacher. The modern conception of method is distinctly a product of elementary education. For the fundamental principles underlying modern method we are indebted to Rousseau, that erratic apostle of liberty for man to be a man, for the child to be a child, who most fully voiced the inchoate ideas of many men with regard to the place and function of the teacher. The center of thought of the older method was subject matter. Here are some things that society demands the pupil should know. "Stamp them upon your memory." Method for the most part consisted in an economical organization of subject matter to be learned and devices for quick and complete memorization, often with entire lack of understanding of what was being learned. Usually textbooks were not used and the teacher was the repository of knowledge. This he presented to the pupils; it was "their's not to reason why," but to learn it and it was the business of the teacher to see that they had it. Rousseau brought a new conception, that the business of education was the development of the child as a child. He insisted that instead of regarding the child as a refractory being needing repression and making over we should develop him as nature intended, his instincts and capacities, his native interests. This changed the whole center of gravity of method and with it the function of the teacher. From that time the *child* became the center instead of subject matter. The teacher was concerned with teaching *children*, not arithmetic, reading, etc. He was no longer concerned with forcing a recalcitrant child to swallow, at the point of the rod, nauseating doses of intellectual pabulum prescribed

by a society of a hundred or five hundred years before, and doing this as described in the song—

> Readin' and writin' and 'rithmetic,
> Taught to the tune of the hick'ry stick,

but in utilizing all the native interests, instincts and capacities of the child for the purposes of the development—the education of the child. That is the essence of modern method.

As is usually the case, this idea has been very slow of realization in educational practice. But its beginning in Rousseau saw the birth of the modern teacher and the beginnings of the development of a real teaching profession. This conception absolutely necessitated a study of children in order to understand the instincts and characteristics of children, and a study of the best methods of utilizing these instincts for education. It also necessitated as definite a study of subject matter as before but with a somewhat different point of view.

In Pestalozzi, the most inspiring teacher of them all, we see many of these imperfectly expressed ideas realized both in the life of the teacher, Pestalozzi, at Stanz with the orphan children, at Burgdorf and at Yverdun and in the development of actual methods of teaching. More important still, however, was his influence on the training of teachers and the impetus he gave to investigation and experimentation by the teacher to discover better methods. His influence on the teacher in America was exerted directly and also indirectly through his disciples, Herbart and Froebel, who, each in his own way, have contributed very largely to the development of method and the training of the teacher. Both emphasized the need for trained teachers, Herbart because he considered the teacher as of supreme importance in the teaching process, Froebel because of his conception of self-activity as the basis of education and the consequent necessity for the teacher to know the child, to know what to give the child, and how to use it to secure proper development. In America, all these influences have combined to bring about the professional training of teachers; but up to very recently the only teachers to feel its influence

were those of the elementary school and of the kindergarten, those teachers who previously had taken lowest rank and have been paid the least.

The first provision for teacher training in this country was probably in the academies. It is, perhaps, significant that the beginnings of our own university were closely bound up with the training of teachers. The English department of Franklin's Academy was especially designed for this purpose; academies in New York, Massachusetts and other states also made special efforts to attract those who were planning to teach and to give some training along this line. The work consisted almost entirely of a review of the subjects to be taught. This was sometimes supplemented by more or less practical talks on the mechanics of the class-room. The Lancasterian or monitorial schools also provided or necessitated training of teachers, but this, too, was formal and consisted in a review of the lesson to be taught and certain practical directions regarding discipline. During the first quarter of the nineteenth century there were a number of distinct and separate attempts to establish schools for the training of teachers. The first normal school to be actually opened was a private school by Rev. Samuel R. Hall which was started at Concord, Vt., in 1823 and operated for seven years. In 1830 Mr. Hall was asked to take charge of the English department in Phillips Academy, Andover, Mass. The purpose of this department was also to provide training for teachers. In 1837 he opened another private normal school at Plymouth, N. H. The work of these schools consisted, as in the other cases, chiefly of review of the branches to be taught, but Mr. Hall gave a series of lectures on the practical aspects of class-room work and the duties of the teacher. These were afterwards published and had a wide circulation.

Through the efforts of James G. Carter and Horace Mann, public supported normal schools were finally established in Massachusetts and other states soon followed. The spread of the normal school idea has been rapid. Especially significant is the development of the public normal schools. Today, scattered all over this country, we may see magnificent build-

ings in which are housed public normal schools with their splendid equipment and facilities for teacher training.

All this development has been for the training of elementary teachers. Where shall we look for like facilities for the training of secondary teachers? Sad to relate, they are chiefly conspicuous by their absence. It is only within the past few years that much attention has been given to this phase of teacher training. Gradually, much too slowly for the needs of the situation, Departments of Education and Schools of Education are being established in our colleges and universities. In these we do find some attempt to provide professional training for secondary teachers, principals and superintendents. We are justly proud of some of these, but how woefully inadequate it is at best!

What shall we say of the professional training of teachers in colleges and universities? Only a small fraction of the instructors in our colleges and universities have any professional training for this work comparable to that of the elementary teacher for his work. The graduate work sometimes required is not even comparable, so far as professional training is concerned, to high school graudation for the elementary teacher.

Turning to the social status of the teacher, we have no exact data. In general the old idea still holds true; the college professor is supposed to have the highest rank, that is, he is supposed to be nearer the top, the secondary teacher next and the elementary teacher last of all. This is, as you see, now in reverse order to the amount of professional training required. It is based on the medieval idea of amount or extent of knowledge the teacher is supposed to possess regarding the subject taught.

We are, of course, very far from a complete realization of our ideals of professional training for all teachers, even in the elementary school, still further from it in the training of high school teachers, as can be seen in the training of teachers in Pennsylvania: but we are progressing. This can be seen in a variety of ways. We can see it in the increase in teachers' salaries shown in the accompanying table.

This is also a rough measure of the change for the better in the social status of the teacher. More significant than this is the increase in the professional requirements for a certificate to teach. Every state in the Union, except eight, now requires some professional training of all candidates for positions in public high schools. California requires a year or, at the least, a half year of graduate work and at least fifteen semester hours of strictly professional training must be taken either as a graduate or as an undergraduate. This marks the present high water mark in professional requirements for high school

INCREASE IN SALARIES OF TEACHERS IN THE UNITED STATES.

	Average Salary per Month.		
	All Teachers.	Men.	Women.
1870	$28.54	.....	.....
1880	29.96	.....	.....
1890	37.47	.....	.....
1895	41.02	$46.82	$39.41
1900	45.11	46.53	38.93
1905	51.10	55.04	42.69
1910	61.70	68.86	53.40
1913	64.71	78.29	61.31

teachers. But we shall inevitably come to the same standard even in Pennsylvania.

Another question of great importance is this, "Do the professionally trained teachers receive more salary than those who do not have such training?" We have no exact data on this point. We do have, however, some data which are significant and which have a distinct bearing on it; they have reference to the relation between salary and years of experience on the one hand and salary and preparation on the other, and are for high school teachers as well as for teachers in the elementary schools:

SALARY INCREASE OF ELEMENTARY TEACHERS IN THE UNITED STATES FOR EACH YEAR OF EXPERIENCE AND OF PREPARATION BEYOND THE ELEMENTARY SCHOOL (COFFMAN).

	Years of Experience.								
	1	2	3	4	5	6	7	8	9
Men.....	$45	$100	$100	$130	$155	$225	$190	$200	$155
Women...	30	80	75	125	125	150	160	185	150

	Years of Preparation Beyond the Elementary School.								
	1	2	3	4	5	6	7	8	9
Men.....	$0	$22	$95	$20	$80	$202	$348	$550	$630
Women...	0	0	0	10	30	102	155	240	248

SALARY INCREASE OF TEACHERS IN CLASS A HIGH SCHOOLS OF MAINE FOR EACH YEAR OF EXPERIENCE AND OF PREPARATION BEYOND THE HIGH SCHOOL (SCOTT).

	Years of Experience.								
	1	2	3	4	5	6	7	8	9
Men.....	$0	$130	$245	$195	$215	$215	$260	$215	$240
Women...	70	80	90	110	185	185	180	175	195

	Years of Preparation Beyond the High School.				
	1	2	3	4	5
Men.....	$25	$45	$ 0	$310	$530
Women.....	0	60	58	120	250

These statistics show beyond question that teachers with longer preparation are receiving higher salaries than those with less, and that added years of preparation mean much more in salary than added years of experience after the first three or four years. It seems reasonably certain, then that added preparation does pay in dollars and cents.

It would be interesting to trace, if possible, some of the differences between the old and the new in the conception of the teacher and of method. Remember that the point of view of the old is not the child but the subject matter. This subject matter is something that society has decided is valuable; it is absolutely necessary for the child to appropriate it. This thought is fundamental in our modern viewpoint also. Subject matter is of great importance; it represents primarily what society demands of the child, and the kind of subject matter is of vital importance. The error of the old was not in emphasizing subject matter, but in disregarding the method by which the child was to appropriate it. The principal difference between the old and the new is that the old disregarded the child in method, or thought of him only as a resisting agency that had to be coerced and made to take what the teacher gave him. The teacher had the knowledge; education was the process of filling the child with this knowledge. The modern illustration of the old idea, of the old type of teacher is shown in a mild way by the talking machine, which is, by the way, a tremenduously useful machine. The process of education consists in making an impression on the rubber disc, the pupil. The machine is then reversed and the teacher listens to the record; if it is very like the original it is marked 98 per cent; if somewhat imperfect, 82½ per cent; but if it is very unlike the original it is marked failed and rejected. The purely lecture plan, seen still in many institutions, is much after the same plan. A friend of mine has recently suggested that an enlargement of the talking machine idea would be very economical in university work. The professor could have his lectures recorded on a machine and given to the class without the necessity of his presence. This plan would

be extremely economical, for several institutions could unite in the employment of the same professor. It would also be of considerable help in the case of enforced absence of students; they could get the material of the lecture without the necessity of copying each other's notes. Such a plan would also enable the professor to sit in his study, at ease, far from the madding and maddening crowd of students and devote the remainder of his time to research.

However this may be, the talking machine is now utilized in our public schools. But it is assigned to its proper place as an adjunct, an aid to real teaching. The moving pictures are also coming into their own as an educational agency.

The center of thought of method in modern teaching is, then, the child, and education is conceived as the process by which the child himself, for himself, appropriates the subject matter which he needs; that is, the *child* is the active agent, not the teacher. One of the marks of the modern teacher is that she utilizes to the full all the native instincts and interests of the child and uses all devices and aids to the end that the child will himself take hold and appropriate, will produce in himself those changes that modern society demands should be produced. The difference between the old and the new is well shown in the modern use of imitation as an aid to education. Among the many uses of this instinct may be mentioned the method of teaching deaf and dumb children, and more particularly the methods used to teach the proper sound of vowels and proper articulation, where the teacher shows the pupil the correct position of lips, tongue and teeth to produce a certain sound; mirrors are used and the pupil taught by conscious imitation to give the correct sound and to articulate distinctly. The fact of imitation, conscious and unconscious, of the teacher by the pupil in matters of posture, of dress, of speech, of conduct, are too obvious to need discussion.

A slight modification of the conception of the teacher is that given in the best Montessori schools where the teacher is supposed to be merely the director of the child's activities. Certain material supposed to be socially adequate is put before the child,

he is allowed to exercise his instinctive activities toward it; if they are not in the direction that is conceived to be valuable, they are repressed or the material removed; if they are in the approved direction they are encouraged. However we may feel about the value of such training, however poorly adapted to the needs of American education it may be, we must admit that it does lay emphasis upon one very important point: the teacher must be in the background; the child must be the active agent.

Such, then, is the conception of the modern teacher. One who gives, one who directs, who knows the end in view, who knows the child, his instincts and interests, who knows how to use them for the desired ends; who serves. Matthew Arnold said, "Mankind is dominated by two passions, the passion for knowledge and the passion for service." Charles W. Eliot adds to this the thought that for true culture, for the highest development, these two must fuse—the passion for knowledge and the passion for service. Far be it from me to disparage the passion for knowledge, the search for truth; no sane man would think of discrediting it; it is vital to our progress; the investigator is a necessity in any progressive society; but have we not too much neglected the passion for service? Do not misunderstand me, I am not a pessimist. I do not believe that the passion for service is dead. I would be deaf indeed if I did not hear the steady tramp of our boys, your boys and mine, making themselves ready for service at the call of their country; I would be blind, indeed, if I did not see the mobilization of industry, of agriculture and of every other agency in this country and if I did not catch its significance. No, the passion for service never dies in the human heart; it may slumber, it may need the trumpet call of a great crisis like this to rouse it, but it is there, and I glory in this manifestation of its presence. But the point I wish to impress upon you just now is that this passion for service is the distinguishing mark of the real teacher, not merely indirect service through the medium of truth discovered, but the kind that comes into direct contact with the object served; that responds not merely

in a great and dramatic crisis but in the humdrum of drudgery, in the comparatively uninspirational life of the school, day in and day out; this is the service of the modern teacher. And when this passion for service, in time of peace as in time of war, shall have a place of equal rank with the passion for knowledge, then will the teacher, as a teacher, take his proper place in modern society.

PROPERTIUS

By Harry B. Van Deventer
Assistant Professor of Latin

The title of my talk this afternoon is announced as "Some Augustan Poets." But I am going to speak of only one who has been much neglected and is little more than a name except to professed students of Latin. This is Propertius. The great poets of the Augustan age are tolerably familiar. We know Vergil, Horace and Ovid from our schooldays, if we have thought of them but little since. Vergil we know for his glorification of the Roman nation, Horace for his worldly wisdom gracefully termed in perfect phrase, Ovid for his psychological analysis of the passion of love. But what of the others? They are Tibullus and Propertius. Of these Tibullus has usually been the favorite. But to the average reader he is monotonous. His ideas are very few and very simple. He loves peace and hates war. He loves his Delia and life in the country. He also loves another lady, who makes large demands on his pocket-book and you hear much of this. He cares nothing for fame or wealth. Those themes recur again and again. Though the volume of his poetry is small, you think he might have said all in a quarter the space and the greater would be his appeal. Whatever the merits of Tibullus, however true he rings, however much the Romans themselves may have preferred him to Propertius, Propertius today is coming unto his own and it is a picture of the poet and his life and his love that we are to consider. Perhaps a few who are here this afternoon may be moved to read his verses, if they have not already done so and learn the story of a man and his overwhelming passion, the story of a love that had its storms as well as its calms, its joys and its sorrows and finally its end, the story of his ambitions and his relations with his friends, in a word, the life of a

man revealed in his poetry. Let us trace the story of his life and the love that inspired his song. Let us see who he was and who his lady was and in that way we shall also see of what sort the man himself was and of what sort his poetry was, because for a long time his life and his love and his song were one. They are inextricably bound together and we cannot examine one without the others. But it is with Propertius the man that we are most of all concerned.

Propertius was born somewhere between the years 54 and 43, let us say 46. There are good philological grounds for that year (which will serve as well as any other nearby date). The birth-place of the poet is also a matter of dispute, but there are good reasons for believing that it was Assisi in Umbia, also the birth-place of St. Francis, called by the Romans Assisium. He tells us that his family was not noble, that no ancestor of his had ever triumphed in battle, and whatever landed estate he inherited, he had, like Vergil, lost by confiscation, when the veterans of Octavian were assigned farms as a reward for their services. But despite this loss, his education was well provided for by his mother, perhaps at Rome. The learned character of his poetry affords proof that his education was ample and thorough. Like most Romans with any pretension to rank he was undoubtedly intended to be a lawyer, but in the lively and dramatic autobiography at the beginning of the fourth book of his elegies, he says that "Apollo taught him a little of his song and forbade him to thunder his speech in the mad tumult of the Forum." For him, as for Ovid also destined to be a lawyer, Roman society and Roman ladies had too much attraction. Like Ovid, he loved the society of women and with his talent for verse-making indulged that bent in the making of light society verse and love poems. But whereas Ovid ever remained the ladies' man, the typical flirt, Propertius soon confined his attentions and his verse-making to one. This one it was and not Apollo who really taught him a bit of song and kept him from the Forum. Cynthia he calls her, as Clodia is called Lesbia by Catullus and as Plania is called Delia by Tibullus. And who was Cynthia who ruled

his heart and his song so long? According to Apuleius, her real name was Hostia, perhaps, since Propertius says she had an illustrious ancestor, the grand-daughter of a poet named Hostius, who wrote a poem in the style of Ennius on the Histrian war. Some critics would emend the passage in Apuleius to Roscia. Then the famous ancestor would be the great actor, Roscius. But whoever she was, Cynthia was obviously no ordinary lady, not a freed-woman nor of humble station like Tibullus' Delia, but a brilliant woman of the world, probably married, much like Catullus' Lesbia, with all her charm and at the same time with all her infidelities. It is generally held that she was not married, but the words of Juvenal at the beginning of his sixth satire seem to indicate that she was. If she was married, her husband apparently figured little in her thoughts. Perhaps he was often away from Rome. However that may be, her reputation was practically gone. She was unfaithful, a coquette, rich and lavish in her spending, a beauty to whose house thronged many admirers, some because they were truly enamoured, others doubtless to while away the time which hung heavy on their hands in the Rome of those days, still others attracted not only by her personal charm, but also by her accomplishments. For of these she had many. She was well educated and could write verse. "Docta puella," the "learned maiden," the poet calls her. She could also sing and dance. Propertius says: "She dances wondrously, even as Ariadne led the Maenads." "When she begins to sing to the Aeolian lyre, she rivals the harp of Aganippe in her skill in playing and challenges with her voice the writings of Corinna of old and counts not Erinna's songs the equals of her own." Of her beauty and personal appearance the poet has much to say, naturally prejudiced, but there can be no doubt that she was indeed seductive. "Auburn is her hair," he says and we think of the Italian beauties that Titan painted, "tapering her hands, tall and full her figure, and stately her walk, worthy the sister of Jove or like Pallas when she strides to the Dulichian altars." In another poem, in which he says it was not her appearance but her accomplish-

ments that attracted him, we have at the same time a further description of her beauty. "It was not her face," he says, "fair though it be, that won me. Lilies would not surpass my mistress for whiteness. It is as though Maeotic snows were to strive with Spanish vermilion or rose-leaves floated on stainless milk. It was not her hair flowing trimly on her smooth neck, it was not the twin torches of her eyes, my stars, nor a girl shining in Arabian silks. It is rather that she dances wondrously." Then come the lines, which I have already quoted, referring to her gifts of singing and verse-making. She had many lovers. Propertius was only one of them and he was younger than she. Without his literary talent it is very doubtful if she would have looked with any favor upon him. Certainly he would not have appealed to her by his manly strength. For he was small and weak. But as in the case of Catullus and Lesbia, they were drawn to each other by literary sympathy. He says she even made the first advances and was flattered at being the theme of his elegies. Of her character we only know what Propertius tells us. Although her good or evil traits are often made prominent by the poet according as she has treated him, well or ill, we can nevertheless form some idea of what she was like. Of course he thinks her fickle, is ever complaining. Sometimes his complaints are well-founded, then again he must know that they are not, even as he writes them. But we can best see her character, as well as his, in a consideration of some of the individual elegies.

Of the four books of the elegies, the first has almost entirely to do with the bright days of their love. The poems are probably in the main chronologically arranged. If they are not, we have no means of proving it. There were quarrels, partings and reconciliations and there is no need of seeking to determine just which reconciliation follows a particular quarrel. This is the pass-time of the pedant. The first elegy of the first book is an introduction to the book, written after the others of that book. You know how Horace and other poets put at the beginning of their books, by way of preface, one of their

last poems, which more or less represents their state of mind at the time of publication and it seems that the lament of Propertius in this elegy has to do with the sorrows he has felt during a year of separation from Cynthia. "A year has passed and my madness is not stayed," he says. The cause of this separation we do not know. He says in one of his later poems that he had done something he should not have and was banished by her for a whole year. This banishment seems to have thrown him into violent dissipation. But he could not forget her. His passion gave him no rest, and this grief is embodied in the poem which was afterwards prefixed to Book I—not a cheerful beginning to a book of love poems, but quite in accord with his prevailing melancholy disposition and perhaps his conception of elegy as a literary form contained a reminiscence of its possible origin. This, however, is conjecture, for the beginnings of elegy are lost in obscurity.

But in the second elegy all is well. The theme is a common one in erotic poetry. Charmed by her beauty he reproaches her with seeking to improve by fair raiment and adornment what nature has already so perfectly made. Here we see Propertius in one of the best of his lighter moods. "Of what avail is it," he says, "to go forth with locks adorned and rustle in slender folds of Coan silk? Of what avail to steep thy tresses in the myrrh of Orontes, to parade thyself in the gifts that foreigners bring, to spoil the grace of nature by the charms that gold can buy? . . . Believe me, thou hast no art, which can make thy form more fair. . . . See what hues lovely earth sends forth. It is the wild ivy that ever springs fairest; loveliest is the arbutus that grows in the caverns of the wilderness and untaught are the channels where the waters run. Begemmed with native pebbles the shores beguile our eyes and birds sing sweeter from their lack of art." Then he says that the heroines of old won their lovers by their "beauty unadorned." They did not seek many lovers, as he hints she is doing with the aid of her finery. They were content with one. Even in the heyday of his glory and happiness, he has some slight suspicions. But who has not?—In the third elegy he tells how one night

he returned late from a party and noiselessly entered the room where Cynthia lay asleep. His first impulse was to disturb her, but he restrained himself. Presently she awakened and upraided him for his infidelity and his lateness in coming to her. In the concluding lines she appeared in a rôle, which she all too seldom played. She is made to say: "But now I was beguiling my eyes from sleep with purple embroidery, and, work-weary, with the music of Orpheus' lyre. Now and then, left thus forlorn, I made gentle moan to myself, till I at last sank down and sleep fanned me with kindly wings. That was my last thought amid my tears." This is a charming picture, often imitated or paraphrased, as we might well expect, by the erotic poets of eighteenth-century France. Indeed, this is true of many of the elegies of the first book, and from it not only did the minor French poets derive some inspiration, but also such masters as Voltaire and André Chénier.

With Cynthia and Propertius all goes well. The poets' friends try to separate the lovers, but in vain. One of them, a certain Tullus, seeks to gain his consent to join him on a military expedition abroad. He would go anywhere in the world with him, he says, but the words of his mistress as she clings about his neck, her urgent prayers, her changing color, all keep him back. Is it worth his while to visit learned Athens or to behold the ancient wealth of Asia, that Cynthia may upbraid him when his bark is launched? He tells Tullus that nature has not fitted him for glory in arms. He is no more of a fighter than Tibullus or Horace. Tibullus could not leave Delia. Horace was too comfortable to fight and, as you know, he ran away at Philippi. None of these Roman poets are warriors. "Love is the only warfare for which the Fates design me," says Propertius and he stays at Rome with Cynthia. Soon she threatens to leave him and go to Illyria with the praetor of that province. She nearly goes, but finally does not. This episode is dramatically presented in an elegy, which contains, so to speak, two scenes. In the first he represents himself as begging her not to go. "Is he of less account to her than chill Illyria? . . . Can she bear the roar of the raging deep? Or make her couch

on the hard ship's bench?" She seems unmoved and sure to go. Then, seeing that she will really leave him, he reconciles himself to his hard lot. He prays that she may have a safe journey. He will love her still and will ask the mariners he meets in what port his love has found shelter. Then comes the second scene. She turns a deaf ear to the praetor's persistency. She does not go and Propertius glories in his victory. The concluding lines are: "Peerless Cynthia is my own. Now is it mine to set my feet on the highest stars of heaven. . . . Come night or day, she is my own. No rival shall now steal my love. It is fixed and sure. The glory of today shall crown my head when white with age." Why she stayed we do not know. Very likely Cynthia herself did not know. But if she refrained from going to Illyria, she soon went to Baiae, a place far more dangerous both for Propertius and for such as Cynthia herself. Baiae was the most fashionable of Roman watering places. Here on the Campanian coast were luxurious idleness and freedom from all restraint. Hither repaired the elite of Rome to their villas, when the summer season made life at Rome intolerable. Here they amused themselves on the shore and on the sea. Here they ate and drank their fill. Here they bathed in the native warm springs and in the Lucrine lake. Propertius is tortured by the fear of rivals, as well he might be. Cynthia would glory in nothing so much as to be the center of a large group of admirers. In the eleventh elegy, written to her there, he says: "Has some enemy of mine with empty show of love stolen thee away from thy place in my songs?" He pictures to himself just how she might be spending her time there. "Better for her to be in a small boat on the Lucrine lake or bathing in the shallow waves of Teuthras than to listen to the fond murmurs of another on the silent strand. . . . For," he says, "when there is none to watch her, a maid will break her troth, remembering not the gods of mutual love." Then, when scarcely these words of suspicion are written, he apologizes and continues: "Not that I doubt thee, but at Baiae all love's advances give cause for fear. Lay all the blame upon my fear." Then, very tenderly: "For I do not watch

over my mother more completely than over thee, nor without thee would life be worth a thought. Thou only, Cynthia, art my home, thou art my parents, thou art each moment of my joy. Be I gay or grave to the friends I meet, whatever my mood, I will say, 'Cynthia was the cause.' Leave with all speed the corrupting life of Baiae. . . . Perish the Baian waters that bring reproach on love." This poem, for its combination of passionate emotion and quiet affection, is one of the best. But why, if Propertius had such fears, did he not immediately follow her there? He only stayed at Rome and made himself thoroughly miserable. Cynthia apparently was at Baiae for some time, but when she returned, she received him with open arms, and then all the riches in the world are as nothing compared to her. "Love will not yield to all the might of wealth," he says in the fourteenth elegy. "For who may rejoice in wealth, if love be not kind? Never be the prize of riches mine, if Venus frown." But she soon treats him badly again, and he goes abroad on a sea-voyage. No sooner is he well on his way, than he of course regrets that he left her and in the midst of a raging storm declares that it was easier to overcome his lady's heart than to stand the violence of the storm. Next we see him still ill treated, in a wood, where he has come for the express purpose of making himself miserable. Here he may freely utter his secret grief, "if only the lone crags can keep faith." He wonders why she scorns him. He has done nothing to displease her and he swears by the beech-trees and the pines, to which he says: "How often do my passionate words echo beneath your delicate shades! How often is Cynthia's name carved upon your bark!" In another elegy, the last in the first book which concerns Cynthia, the melancholy inherent in his character finds expression in the thought of death. Death is prominent in his thoughts, when he is unhappy. Here he is thinking of the lower world, but even there none of the heroines of old will attract him and the beauty of none of them will please him more than Cynthia.

But their mutual happiness is now to be broken. Cynthia

had never been much more than entertained by him, as Lesbia had been by Catullus and now comes the beginning of the end. Now perhaps she was tired of him, annoyed by his excessive ardor. At any rate something happened. He did something and she would have none of him for a year. During this year of absence and diversion in other things, largely, as we have seen, in debauchery, he published the first book of his elegies, to which he gave the title, "Cynthia." It procured him both the favor of Maecenas, ever quick to recognize poetic talent and also a reconciliation with Cynthia, who was proud of gaining fame through his poetry. It is easy to see how a woman of her type would take great satisfaction in suddenly becoming famous. The connection thus resumed lasted three years, but their relations were never again to be the same. For a short time they seemed to be quite on the old basis. Then we begin to see a constant effort on the part of Propertius to renounce the whole affair. But he can not. We find quarrels and reconciliations coming with greater frequency. He is ashamed of himself. He reproaches himself. He thinks of other things besides Cynthia. He contemplates devoting himself to serious study, and then in the same breath says: "I was as one who seeks to see whether a fish may live on the dry sands or a fierce wild boar in the midst of unfamiliar waves, when I tried to see if I could spend one night in severe study. Love is but put off, never extinguished." Her many lovers and infidelities annoy him, but they no longer surprise him. There had been a time when he had at least imagined that he was the only one, but not now. "Not so," he complains, "was the house of Lais thronged, at whose doors all Greece lay bowed. Nor ever did Menander's Thaïs, the darling of the people of Athens, gather about her such a swarm of galants." He still writes of Cynthia, and writes from the heart, but not so much to gain her love as because he can successfully write of nothing else. He has written on other themes, as we shall see, but is discouraged. Apollo has appeared to him in a dream and has said: "Who bade thee essay the task of heroic song? Not hence, Propertius, mayest thou hope for fame. Soft are

the meads over which thy little wheels must roll, that often thy book may be read by some lonely girl, who waits for her absent lover." A motive now is to entertain and instruct, in a way, in the art of love, that others may perhaps profit by his intimate experience. The Illyrian praetor returns and finds Cynthia more compliant than formerly. He has increased, undoubtedly by the means prevalent in a Roman province, his already considerable wealth and Cynthia helps him celebrate his return. But it is only for his money that she treats him so well, thinks Propertius, not yet disillusioned, and directs his reproaches rather against her greed than her fickleness.

All Propertius can do in the world is write and he can write nothing successfully as yet but love poetry. Occasionally he tries his hand, but it is usually a failure. Sometimes Marcenas, recognizing his natural gift, seeks to rouse him to more worthy subjects, but he only replies: "Why dost thou launch me on so wide a sea of song? Such spreading canvass does not suit a bark like mine. It brings but shame to take upon a burden that one cannot bear and soon to bow the knee and turn in flight. All things are not meet alike for all men." He cannot write epic. It is enough for him to have found acceptance among the books of Callimachus and to have sung in strains like his. "Let my writings kindle boys and girls to love," he continues, "let them acclaim me as a god and bring me sacrifice," and yet in the same poem he looks forward to the time, when he shall have summoned his strength to sing of the deeds of Augustus. He sincerely hopes to emancipate himself from Cynthia and rise to better things. He thinks of going abroad in the hope of forgetting her. In an elegy, which recalls the similar predicament of Catullus, he says: "I am constrained to set forth on a mighty journey to learned Athens, that long travel may free me from the burden of love. For my love for my lady grows with gazing on her. Love itself is love's chief nourishment." He will study, at Athens, Epicurus and Plato, Demosthenes and Menander and the bright masterpieces of Athenian art will delight his eyes, and he ends with

the words: "Either length of years or the wide sundering spaces of the deep shall heal the wounds hidden in my silent heart, or, if I die, it shall be fate, not dishonoring love, that shall lay me low. And the day of my death shall bring me no disgrace." In another passage he calls on Bacchus to wash the weakness from his soul. But whether by voyaging abroad or by wine, he is eventually freed from the grip of his love, which has long since been only a sorrow and in the two elegies written at the time of the final break we see what he thinks of the Cynthia who had enslaved him. Let me quote these two short poems. The first reads: "Fake, woman, is the trust thou puttest in thy beauty. Long, since the partial judgment of of my eyes has made me over-proud. Such praise of old my love bestowed on thee and now it shames me that thou hast glory from my song. Often did I praise the varied beauty of thy blending charms, and love deemed thee to be that which thou wert not. Often was thy hue compared to the rosy star of dawn, though the splendor of thy face owed nothing to nature. This madness my father's friends could not drive from me nor any witch of Thessaly wash from me the waves of the wild sea. All this—no fire or knife compelling—I confessed in utter truth, wrecked on a very ocean of trouble. Venus caught me and seethed me in the caldron of her cruelty; my hands were twisted and bound behind my back. But behold! my ships have found haven and wear wreaths of thanksgiving, the Syrtes are crossed and my anchor cast. Now at last my senses return to me, weary of the wild sea tides. My wounds have closed. My flesh is healed. Good Sense, if any such goddess there be, I dedicate myself to the service of thy shrine, for Jove was deaf and took no heed of all my vows." And the second of the two elegies: "They made mock of me, where the tables were set for feasting. The tongues of the vilest were suffered to make free with my name. For five years I had the heart to be thy faithful slave. Often shalt thou gnaw thy nails and mourn for my lost loyalty. Tears move me not a whit. It was tears that ensnared me of old. Cynthia, thou never weepest save to deceive. I, too,

shall weep as I depart, but my wrongs are stronger than grief. For thou dost not let the yoke sit easy on my shoulders. Farewell the threshold, still weeping with my plaint. Farewell that door, never broken by my hands for all its cruelty! But may weary age bow thee down with the years thou hast concealed and may ill-favored wrinkles come to mar thy beauty. Then mayest thou desire to tear out thy white hairs by the root, when the mirror mocks thee with thy wrinkles. . . . Mayest thou endure another's haughty scorn. When thou art old, mayest thou lament what thou hast done! Such curses fraught with doom are the burden of my song for thee. Learn to dread the end that awaits thy beauty." Thus also does Catullus cast off Lesbia, and Horace anticipates such an end for one of the ladies of his fancy. Common sense has prevailed over passion. Perhaps also Cynthia's advancing years and a certain loss of physical charm have influenced Propertius. But the thought of her still lurks in his mind and we see a feeling of remorse at her death, which takes place soon after. Apparently, though he spurned her as the object of his love, he was, perhaps out of pity, her friend till death. Perhaps she begged him to come to her in the days of her last illness, and he went. He may have been the only friend she could rely on. This seems to be the only way of explaining the weird seventh elegy of the last book, wherein her ghost appears to him shortly after her death; reproaches him for his carelessness in superintending her funeral; gives him some instructions as to the disposition of her household; upbraids him because she now has a rival and ends by saying: "Now let others possess thee. Soon thou shalt be mine alone. With me thou shalt be." Propertius seems to have been, in spite of everything, overcome with grief at her death and unable to attend her funeral. Of his sorrow this poem is the expression. Thus ended the love, which was indeed the whole of the poet's life. Other interests he had and other poetry he wrote, but it was Cynthia that made him a poet. What ability he had was due to her. Long ago he had said: "It is not Calliope nor Apollo that sings these songs to me. It is my lady herself

that makes my genius," and this was so. Only two poems are we sure that he wrote after her death, and those for special occasions, one of them to celebrate the battle of Actium, doubtless at the request of Maecenas. His own words proved to be more prophetic than he had thought, when he wrote: "Cynthia was the beginning, Cynthia shall be the end."

Soon Propertius himself died. We have no evidence that he lived long, no poems that indicate that he lived after 16. Two passages in the younger Pliny are often cited to prove that he lived for some time, that he married and had children, but they are unconvincing. So we may say that he probably died not long after his thirtieth year.

But although Cynthia occupied so much of the poet's life and during his best years almost entirely absorbed him, we must not suppose that he had no other interests. Of intimate friends he seems to have had but few. At least, but few are mentioned by him. A young merchant named Paetus held a warm place in his heart and his death by drowning, while on a voyage to Egypt undertaken for some commercial enterprise, is the occasion of one of the most beautiful of his poems. The shock caused by the death of a man so young long before his time, the contrast between his delicate frame and the cruelty of the waves, between burial among his own people and the vast grave of the sea, which received him, are some of the touches in this, one of the truest elegies in Latin literature. His friends, Bassus and Tullus, are known to us as seeking to induce him to break with such an ignoble object for his affection as Cynthia. A certain Gallus annoyed him because of his interest in her. These and a few others are all we meet with.

But the poet's relations with the literary celebrities are at once interesting and shed some light on the position of Propertius in Rome as a poet. Maecenas, who was ever ransacking Rome for young literary men of promise, soon discovered Propertius and became his friend and patron, not the intimate friend that he was to Horace, but Propertius must often have

been at the house of Maecenas, and, though he did not belong to the inner circle, must have known its members tolerably well. Of them all he seems to have admired Vergil the most. Speaking of the Æneid, he says: "Yield, ye bards of Rome, yield, ye singers of Greece. Something greater than the Iliad now springs forth to birth." Ovid says that he often heard Propertius recite his love poems. We hear nothing of Tibullus, who belonged to a different circle, nor of Horace. Very likely Horace and Propertius were, to say the least, not intimate. To Horace Propertius is only the Roman Callimachus, a writer of whining elegies, as he calls them. They could never have gotten along. A young love-sick poet, with thoughts of little else but Cynthia and his troubles, could not in the nature of things appeal to a smug, placid, man of the world like Horace, whose attitude toward amorous adventures we all know so well. Further, as the chief representative of Alexandrianism, he must have been repulsive to Horace, who drew his inspiration from the earlier masters of Greek poetry. But for Cynthia Propertius might have led a peaceful life of ease in the literary companionship of his friends. And yet with all the trouble and sorrow she caused him, she gave to his life a zest and to his work a soul as nothing else could have.

Such was the life of the pale, thin poet, whose health was never good and thus we may explain the melancholy tone, which pervades his work. He was often weary and heart-sick and how often he thought of death, when his world seemed so dark! His nature was soft and gentle rather than strong. He was morbidly self-conscious, often indulged in gloomy forbodings. His will was weak and he lacked self-control and restraint. And, therefore, how easy it was for him to yield to his love and how difficult to free himself from it, when he realized it was unworthy of him. Against its irresistible torrent he could not contend. Often weaknesses in a man appeal to us fully as much as the stronger qualities, because we all know how hard it is to struggle against them and how often we fail. Just for this reason does Propertius inspire our sympathy and then our interest. But though weak, he possessed

in full measure the gentleness and tenderness that so often go hand in hand with weakness.

I have spoken only of Propertius as a man. I wish there were time to speak further of his poetry. Perhaps the best of all the elegies has not even been mentioned. Cornelia, descended from the Scipios, the wife of Lucius Aemilius Paulus, has just died and addresses her husband from the lower world. She pleads her case before the judges of Acheron and ends with the charge to Paulus to watch lovingly over their children. It is a splendid poem, full of pathos and eloquence, in the words of a famous scholar who at the same time had some appreciation for literature, "the queen of elegies." The aetiological elegies may on the whole be regarded as a failure. They represent the poet's attempt to do as Maecenas bade him. They are of interest, because they probably suggested to Ovid the idea carried out in the Fasti, as the erotic epistle of Arethusa to Lycotas may have been the fore-runner of the Heroides. Perhaps Propertius is at his best in the rôle of court poet in the elegy which he wrote to celebrate the victory at Actium.

The unpopularity of Propertius in modern times is often attributed to his excess of learned mythological illustration and adornment. But it will be found on close inspection that he is not more at fault in this respect than Ovid. And do not Horace and Vergil use these devices to a very great degree? The circle of readers demanded it. The real reasons are his obscurities in style and the seriousness which he displays in the portrayal of a passion which many readers refuse to take seriously. This obscurity is often baffling, not so much for lack of clearness in his ideas themselves as in the way in which he passes from one idea to another. His transitions have ever been a stumbling-block to scholars, and how much more so to the general reader! But it was a part of his art, as he conceived it, to seem impetuous and make it appear to the reader that his emotion was running away with his thoughts. This is a common device with many of the most pains-taking of poets. But with these faults, if they are faults, there is a brilliancy and an originality in his language and versification

and a depth of feeling and pathos, which are nowhere else, save in Catullus, to be seen in the whole of Latin literature. If ever a poet spoke from the depths of his heart, it was Propertius. He is difficult reading. You cannot understand him, unless you read him carefully and read him again and expend upon him much thought and study. You must drink deep of the Pierian spring, and you will be well repaid.

GLEANINGS FROM OLD GARDENS AND FROM OLD GARDEN LITERATURE

By George Walter Dawson
Professor of Drawing

An hour is such a short time to devote to the subject of gardens, a subject that includes all ages, all countries, all people—that deals so intimately with man's needs, aesthetic as well as useful, and nature's gifts. A subject in which man, and his works, and vast nature, and her works, are so intimately united that it is hard to find a point of approach about which to talk; a subject that has varied with the ages; and that has, alas, at times— followed fashion almost blindly.

It is a subject that could be divided into uncountable parts, any one of which might easily claim all of the time alloted to us. Because of the short time allowed I felt the necessity of approaching it from a very general standpoint rather than from any particular one, and so I announced my talk as "Gleanings from Old Gardens and from Old Garden Literature," thinking it would be more pleasant to wander about and gather here and there, just as one might wander along the path of some old garden, culling a few old time blossoms or a sprig of sweet-scented foliage, enjoying the sunlight or the flecking shadows and resting for a while on some sequestered bench to listen to the splash of fountain or song of bird and perhaps—meditate on the passing charms of gardens.

What a mental picture the mere mention of the word garden brings forth! It is as the magic key of Prince Agib opening the door of the mansion that revealed wonders like Paradise; for, its sound unlocks the gates of memory and, again, for a little while, allows full play of that greatest of youthful possessions imagination. To each and everyone a different picture and a different memory comes.

Memory pictures for us the ordered garden with its trimmed

box hedges enclosing beds of choicest flowers, such as exist in old Portsmouth and Salem gardens, our own old Germantown gardens, Mount Vernon, and the old gardens by the James River.

It brings visions of that lovely walled-in garden of the Medici's at Castello, with its gay flower beds, its regal alleys and its superb fountain backed by its ilex wood, which will never be forgotten by those who have read Mary Robinson's sensitive verse beginning:

"The Triton in the Ilex Wood
Is Lonely at Castello.
The Snow is on him like a hood.
The Fountain Reeds are yellow."

It recalls the loving care that we so often have seen bestowed by humble cottager or lowly peasant, on window-box and potted plant.

With that recollection must come another of the princely use of flower urns for the lemon and the orange trees that adorn those gardens where they may not be planted in the earth and must be housed in the winter.

Memory again recalls the cottager's love of flowers, as shown in every English village by his care in placing them near his door while his potatoes, his onions and beans are relegated to a place behind the hedge; it recalls the garden of the nearby Manor-house with its strangely tonsured yews and box bushes giving a touch of unreality while adding strength and interest to the garden, if, exciting an influence which if not under curb may perhaps lead from quaintness to absurdity.

From this playful pleasant formality the memory pictures another peaceful quiet garden with its green carpet and bright border of flowers shut in by its clipped wall of green which encloses also that quiet pool which doubles the charm of the Petite Trianon and its embowering garden; and, this picture is followed by others: the Garden of St. Cloud with its grand fountain of many jets and the still more elaborate fountain gardens of Versailles and Fontainebleau.

From princely gardens capricious memory jumps to the

little garden that Hopkinson Smith loved so to paint on that quiet small canal in Venice where oleanders and roses topped and hung over the wall and enlivened the sage green water by the rippling tongues of reflected red.

Then there comes to the mind picture after picture of four-court gardens all along the grand canal; of gardens rising from the Lake's edge at Como; of their water stairways; their cool terraces and sparkling fountains; of enchanting views across the lake to the mountains; and of balustrades, rose entwined with swag-like festoons reaching down, narcissus like, to the reflection below.

The thought of these rose entwined balustrades again recalls humble doorways in England and New England, embowered by white roses urged to perfection by perhaps even more kindly care than ever was bestowed on kingly gardens.

Other pictures present themselves: A series of pathways, the orchard with its grass path and broad borders of old-fashioned perennials overhung with apple bows; its slightly richer parallel with paved path of flag-stone or brick; then the straight path, flower-bordered, that leads so joyously and hospitably to the open door and to friendliness and cheer; and the path, bright with favorite flowers, that divides the kitchen garden and makes that part of the garden of England one of the best remembered and most colorful of pictures.

Then there are other walks that come to mind of more stately character; Dorothy Vernon's walk beneath the grove on that well-remembered terrace at Haddon Hall; the long shaded walks in the ilex grove of the Bobboli garden in Florence; the terrace pathways of the hanging gardens above the bay of Salerno; and, the monastic walk under the vines and above the sea at Amalfi.

So memory takes us into many places and we know that love of gardens, of flowers, of trees, and indeed of all nature, is not of one country, but of all; and, as gardens are of all countries, so is the literature of gardens of all and of all ages.

In trying to find some arrangement for the great mass of the literature of gardens that exists it seems to me that there is a

considerable amount among the Greek and Roman writers; that little appears from about the sixth to the twelfth centuries; but that from that time on there is an ever increasing amount, until in our own day there seems to be no end of new books on gardens.

Through all ages we find much that is polite and sensitive and often poetical. Yet through all there seem to be two strong forces: one advocating order and system and craftsmanship, combined with love of growing and living things; and the other naturalistic and filled with an admiration and love of flowers and trees of field and wood, yet often militantly opposed to anything that has to do with man's own creative instinct, but upholding in the main his imitative power.

These two characteristics divide, then, much of the literature of gardens.

Aside from these, we might arrange our garden literature under these general headings, namely:

The praise of gardens.
Gardens of romance.
Descriptions.
Discourses—philosophic and otherwise.
Historical.
Horticultural.
Analysis of the art of garden making.

I have taken—rather at random—a few quotations, for the most part descriptive, and mainly from ancient writers. These to be as a foreword to the pictures that I am to show you later and that we may see how the gardens that we know best are but the compliment of those older writings.

I like those writings that sing the praise of gardens; and particularly this of Epicurus, embodying the spirit of contentment and hospitality combined with pleasure in his garden possessions, without which no garden can have charm.

Epicurus, B. C. 342–270.

"As for myself, truly (I speak modestly, and therefore may be permitted) I am not only well content, but highly pleased

with the Plants and Fruits growing in these my own little Gardens; and have this inscription over the door, 'Stranger, Here, if you please, you may abide in a good condition; Here, the Supreme Good is Pleasure; the Steward of this homely Cottage is hospitable, humane, and ready to receive you; He shall afford you Barley-broth, and pure water of the Spring, and say, Friend, are you not well entertained? For, these Gardens do not invite hunger, but satisfy it; nor increase your thirst with drinks, while they should extinguish it, but wholly overcome it with a Natural and Grateful Liquor.' "

Then there is this still earlier reference of Xenophon's describing a visit of Lysander to Cyrus of Persia, in which we again find praise and pleasure in the beholding and a justifiable pride in the planning, planting and caring for the garden.

Xenophon, B. C. 444–359.

When Lysander brought presents to Cyrus from the cities of Greece, that were his confederates, he received him with the greatest humanity, and amongst other things showed him his garden which was called "The Paradise of Sardis;" which when Lysander beheld he was struck with admiration of the beauty of the trees, the regularity of their planting, the evenness of their rows and their making regular angles one to another; or, in a word, the beauty of the quincunx order in which they were planted, and the delightful odours which issued from them, Lysander could no longer refrain from extolling the beauty of their order, but more particularly admired the excellent skill of the hand that had so curiously disposed them; which Cyrus perceiving, answered him: "All the trees which you here behold are of my own appointment; I it was that contrived, measured, laid out the ground for planting these trees, and I can even show you some of them that I planted with my own hands."

Cicero refers to this quotation from Xenophon in his "Defense to Old Age," when discoursing on agriculture and joys of country life; and—I add an excerpt from his "Defense" which,

though not a direct reference to gardens, does show his pleasure in all that has to do with out-of-door life and a joy in flowers and things ordered.

Cicero, B. C. 106–43.

"There are numerous other joys of country life beside the fields and the harvest; we farmers find pleasure in our vegetable gardens, our orchards, feeding our sheep, the swarming of honey-bees, the profusion of spring flowers; we enjoy planting our trees in rows, but more than that we enjoy grafting which we consider the most skilful device agriculture has yet discovered."

"I need not speak of the greenness of meadows, the orderly rows of trees, nor the attractiveness of vineyards and olive groves. But I will say this, that nothing can be richer in utility or more attractive in appearance than a well-cultivated field."

Then like Cicero we find Virgil writing about husbandry in a manner that is not only absorbing but beautiful; and, in the Georgics, Book IV, relating to the management of bees (of which every garden should boast at least one hive) he expresses the wish that he might sing the praise of the culture and adornment of gardens. We can but regret that he did not set his genius to the task.

Virgil, Georgics, Book IV, First century.

"Let gardens fragrant with saffron flowers invite them; and the protection of Hellespontaic Priapus, the averter of thieves and birds, with his willow scythe preserve them. Let him who makes such things his care, himself bring thyme and pines from the high mountains, to plant them far and wide about their hives: let him wear his hands with the hard labour, set himself the fruitful plants in the ground and water them with kindly showers.

"And indeed, were I not just furling my sails at the last period of my labours, and hastening to turn my prow to land, perhaps I might both sing what method of culture would adorn

rich gardens, and the rose-beds of twice blooming Paestum; and how endive and banks green with parsley delight in drinking the rills; and how the cucumber winding along the grass swells into a belly: nor had I passed in silence the late-flowering daffodil, or the stalks of the flexile acanthus, or the pale ivy, and the myrtles that love the shores. For I remember that under the lofty turrets of Œbalia, where black Galaesus moistens the yellow fields, I saw an old Corycian, to whom belonged a few acres of neglected land; nor was that soil rich enough for the plough, proper for flocks, or commodious for vines. Yet here among the bushes, planting a few pot-herbs, white lilies, vervain, and esculent poppies all around, he equalled in disposition the wealth of kings, and returning late at night, loaded his board with unbought dainties. He was the first to gather the rose in spring, and fruits in autumn; and, even when sad winter split the rocks with cold, and bridled up the current of the rivers with ice, in that very season he was cropping the locks of the soft acanthus, chiding the late summer, and the lingering zephyrs."

"But these I for my part pass over, restrained by the narrow bounds I have prescribed to myself, and leave others hereafter to record."

The old romancers occasionally made their characters take joy and pride in gardens, and I add the following quotation, which is really a back ground for the introduction of Cupid in an old Greek romance by Longus.

Longus, Daphnis and Chloe, Book II, Fourth century.

"I, who now address you, my children, am Philetas. I have a garden which I cultivate with my own hands, and in which I have always worked, since I became too old to tend my herds. In it is every production of the different seasons; in spring it abounds with roses, lilies, hyacinths, and either kind of violets; in summer with poppies, pears, and apples of every sort; and now in autumn, with grapes, figs, pomegranates, and green myrtles. A variety of birds fly into it every morning,

some in search of food, and some to warble in the shade; for the over-arching boughs afford thick shade, and three fountains water the cool retreat. Were it not inclosed with a wall, it might be taken for a natural wood."

The praise of gardens and the joy in their possession continues on through the ages to our own time when countless beautiful things have been written in their praise.

But let us turn to the romancers, for they have in their settings made much of the garden and at times have pictured them so minutely that some at least must have had actual gardens in mind.

Homer, in his epic poem celebrating the adventures of Ulysses, singing the praises of the house of King Alcinous and of his garden, pictures something too real to be just the flight of imagination.

Homer, Odyssey, Ulysses at the house of Alcinous, Book VII, l. 112. B. C. 922–927.

"Ulysses went on to the house of Alcinous, and he pondered much as he paused a while before reaching the threshold of bronze, for the splendour of the palace was like that of the sun or moon.

"Outside the gate of the outer court there is a large garden of about four acres with a wall all round it. It is full of beautiful trees—pears, pomegranates, and the most delicious apples. There are luscious figs also, and olives in full growth. The fruits never rot nor fail all the year round, neither winter nor summer, for the air is so soft that a new crop ripens before the old has dropped. Pear grows on pear, apple on apple, and fig on fig, and so also with the grapes, for there is an excellent vineyard: on the level ground of a part of this, the grapes are being made into raisins; in another part they are being gathered; some are being trodden in the wine tubs, others further on have shed their blossom and are beginning to show fruit, others again are just changing colour. In the furthest part of the ground there are beautifully arranged beds of flowers that are in bloom all the year round. Two streams go

through it, the one turned in ducts throughout the whole garden, while the other is carried under the ground of the outer court to the house itself and the town's people draw water from it. Such, then, were the splendours with which the gods had endowed the house of king Alcinous.

"So here Ulysses stood for a while and looked about him, but when he had looked long enough he crossed the threshold and went within the precincts of the house."

Then Longus, a Greek romancer of the fourth century, tells of the gardens kept by Leamon for his lord and master Dionysophanes.

Longus, Daphnis and Chloe, Book IV.

"His garden was indeed a beautiful one, and laid out in a princely style. It was situated on high ground, and was five hundred feet in length, while in breadth it contained four acres, so that one might have supposed it an extensive plain. In it were all kinds of trees,—the apple, the myrtle, the pear, the pomegranate, the fig, the olive, which grew here in perfection. On one side of this garden was a loftly vine, whose branches, laden with blackening grapes, were suspended above the apple and pear trees, as if vying with them in the show of fruit. Such were the cultivated trees. There were also cypresses, laurels, planes, and pines, over which an ivy instead of a vine stretched out her branches, with berries in size and colour resembling grapes.

"The fruit trees occupied the interior space. Those which did not bear fruit were ranged on the outside, serving the purpose of an artificial fence; and the whole was inclosed by a slight hedge. All were placed in a strict and regular order, so that their trunks were perfectly distinct one from the other, but at a certain height their branches met and intermingled their leaves with a regularity which, though the work of nature, appeared to be the effect of art. Here were also beds of various flowers, some of which were cultivated plants, and some the spontaneous production of the soil. The rose bushes, hyacinths, and lilies had been planted by the hand of man, the violets, the

narcissus, and the pimpernel sprang naturally from the ground. There was shade for summer, flowers for spring, fruits for autumn, and for all seasons of the year enjoyment.

"From this garden was to be had a fine view of the plains with the herds and flocks which grazed upon them; as well as of the sea, and of the ships, as they were sailing along, so that the prospect was no small portion of the beauty of the place. Exactly in the middle there was a temple and an altar, dedicated to Bacchus. An ivy encircled the altar, and a vine extended its branches round the temple.

"Such was the garden, which Lamon was busy in getting into order, cutting away dead wood, and raising the branches of the vines. He crowned the statue of Bacchus with flowers, he conducted water from the fountain, discovered by Daphnis, for the flowers, which was used exclusively for them, and was called Daphnis's Fountain."

In both this description and the earlier one by Longus, he, at the same time that he has created a beautiful background, has embodied into the description every essential part of an ordered garden. He plans for all seasons: he combines trees and vines, flowers and fruits; he provides fountains, he plans for sounds and odours until nothing seems wanting. He has not forgotten outlooks over field and sea, nor richer adornments of temples and altars to Bacchus.

A later Greek romancer, Achilles Tatius, portrays another garden setting, in his tale of Clitopho and Leucippe, that again, not only makes a rich tapestry-like background to the story but with equal fullness a complete and charming garden.

Achilles Tatius, Clitopho and Leucippe. Fifth century.

"The maiden was in the pleasance belonging to the house. It consisted of a grove which afforded a delightful object to the eyes; around it ran a wall, each of the four sides of which had a colonnade supported upon pillars, the central space being planted with trees, whose branches were so closely interwoven that the fruits and foliage intermingled in friendly union. Close to some of the larger trees grew the ivy and the

convolvulus; the latter hanging from the plane-trees, clustered round it, with its delicate foliage; the former twining round the pine, lovingly embraced its trunk, so that the tree became the prop of the ivy, and the ivy furnished a crown for the tree. On either side were seen luxuriant vines, supported upon reeds; these were now in blossom, and hanging down from the intervening spaces were the ringlets of the plant; while the upper leaves, agitated by the breeze and inter-penetrated by the rays of the sun, caused a quivering gleam to fall upon the ground, which partially lighted up its shade. Flowers also displayed the beauty of their various hues. The narcissus, the rose, and violet, mingling together, imparted a purple colour to the earth; the calyx of both these flowers was alike in its general shape, and served them for a cup; the expanded rose-leaves were red and violet above, milky white below, and the narcissus was altogether of the latter hue; the violet had no calyx, and its colour resembled that of the sea when under the influence of a calm. In the midst of the flowers bubbled a fountain, whose waters were received into a square basin. The work of art served the flowers for their mirror and gave a double appearance to the grove by adding the reflection to the reality. Neither were there wanting birds; some of a domestic kind, reared by the care of man, were feeding in the grove; while others, enjoying their liberty of wing, flew and disported themselves among the branches. The songsters were grasshoppers and swallows, of which the one celebrated the rising of Aurora, the other the banquet of Tereus. Those of a domestic kind were the peacock, the swan, and the parrot; the swan was feeding near the fountain; a cage suspended from a tree contained the parrot; the peacock drew after him his splendid train; nor was it easy to decide which surpassed the other in beauty, the tints of the flowers themselves, or the hues of his flower-like feathers."

I would recall that Bocoaccio, too, sets his scene for the Decameron in a stately palace situated on "a little hill plentifully stored with fair spreading trees surrounded by gardens,

meadows, and their pleasant walks, with wells and springs of fair running water all encomposed with branching vines."

Nor must we forget the gardens of the Arabian Nights Tales or the romances of the Alhambra by Washington Irving, with backgrounds of the gardens of the Lindaraja and the Generalif. Nor can I pass by Shakespere, who, though he does not describe or particularly praise gardens, so far as I recall, does order the settings of many of his most delightful scenes in gardens. As Olivia garden in Twelfth Night, Portia's garden in the Merchant of Venice, Leonatos garden in Much Ado about Nothing and Julias garden in the Two Gentlemen of Verona.

Turning from the romancers to those writers who take up the more exact description of gardens, we find many interesting and helpful passages, but they are generally lacking in color and charm.

Varro describes his Villa of Casinum; Siculas the hanging gardens of Babylon; Pliny describes both his Villa Laurentinum and his Tusculan Villa; and there are many others.

We will consider only Pliny's description of his Tusculan Villa. He writes:

Pliny the Younger, 62–167:

"My villa is so advantageously situated, that it commands a full view of all the country round. Behind, but at a great distance, stand the Apennine Mountains. In the calmest days we are refreshed by the winds that blow from thence. The exposition of the principal front of the house is full south, and seems to invite the afternoon sun into a spacious and well-proportioned portico. In the front of the portico is a sort of terrace, embellished with various figures and bounded with a box-hedge, from whence you descend by an easy slope, adorned with the representation of divers animals in box. This is surrounded by a walk enclosed with tonsile evergreens shaped into a variety of forms. Beyond it is the Gestatio, laid out in the form of a circus, ornamented in the middle with box cut in numberless different figures together with a plantation of shrubs, prevented by the shears from shooting up too high;

the whole is fenced in by a wall covered by box, rising by different ranges to the top. On the outside of the wall lies a meadow that owes as many beauties to nature, as all I have been describing within does to art; at the end of which are several other meadows and fields interspersed with thickets. At the extremity of this portico stands a grand dining-room which opens upon one end of the terrace; as from the windows there is a very extensive prospect over the meadows up into the country, from whence you have also a view of the terrace and such parts of the house which project forward, together with the woods enclosing the adjacent hippodrome. Opposite almost to the centre of the portico stands a square edifice, which encompasses a small area, shaded by four plane-trees, in the midst of which a fountain rises, from whence the water, running over the edges of a marble basin, gently refreshes the surrounding plane-trees and the verdure underneath them. . . . In the front of these agreeable buildings lies a very spacious hippodrome, entirely open in the middle, by which means the eye, upon your first entrance, takes in its whole extent at one glance. It is encompassed on every side with plane-trees covered with ivy, so that while their heads flourish with their own foliage, their bodies enjoy a borrowed verdure; and thus the ivy, twining round the trunk and branches, spreads from tree to tree, and connects them together.

"Between each plane-tree are planted box-trees, and behind these, bay-trees which blend their shade with that of the planes. This plantation, forming a straight boundary on both sides of the hippodrome, bends at the farther end into a semicircle, which, being set round and sheltered with cypress-trees, varies the prospect, and casts a deeper gloom; while the inward circular walks (for there are several) enjoying an open exposure, are perfumed with roses, and correct, by a very pleasing contrast, the coolness of the shade with the warmth of the sun. Having passed through these several winding alleys, you enter a straight walk, which breaks out into a variety of others, divided by box hedges. In one place you have a little meadow, in another the box is cut into a thousand different forms: some-

times into letters expressing the name of the master; sometimes that of the artificer; whilst here and there little obelisks rise, intermixed alternately with fruit-trees, when on a sudden, in the midst of this elegant regularity, you are surprised with an imitation of the negligent beauties of rural nature, in the centre of which lies a spot surrounded with a knot of dwarf plane-trees.

"Beyond these is a walk planted with the smooth and twining Acanthus, where the trees are also cut into a variety of names and shapes. At the upper end is an alcove of white marble, shaded by vines, supported by four small Carystian pillars. From this bench, the water, gushing through several little pipes, as if it were pressed out by the weight of the persons who repose themselves upon it, falls into a stone cistern underneath, from whence it is received into a fine polished marble basin, so artfully contrived that it is always full without ever overflowing."

From this again we glean that the old Roman not only sought for a vantage point where could be had commanding and beautiful views and cooling breezes, but that he combined in his villa gardens all the variety and beauty possible and disposed the various parts so that he had constant changes. But again, the essentials are groves and gardens and open spaces, walks, fountains and commanding views, contrasts of light and shade and of formality and natural arrangements.

It would be pleasant to review some of the old writers that discourse and philosophize on gardens. It would be interesting to place side by side extracts from those ancient writers who, like many of our modern writers, take sides of the naturalistic versus the ordered gardens. It would be illuminating to follow both the writers who dwell on the historic side of gardens and those who take up the horticultural side; but these must be left until perhaps another time, for it is more to our purpose to take a few minutes of the time that remains to a brief consideration of those who dwell on the arrangements of gardens.

These are many, and many are very worth careful consideration, but I particularly feel that Francis Bacon offers in charming form what might be followed—with variation because of temperment and condition of place—by most of us.

He speaks of a garden as "the purest of human pleasure," and as "the greatest refreshment of the spirits of man."

Francis Bacon, 1561–1626.

Then he enumerates those plants that are best for each month. I like his discourse on the breath of flowers and quote in full:

"And because the Breath of Flowers is far Sweeter in the Air (where it comes and goes, like the Warbling of Musick) than in the Hand, therefore nothing is more fit for that Delight, than to know what be the Flowers and Plants that do best perfume the Air. Roses, Damask and Red, are fast Flowers of their Smells, so that you may walk by a whole Row of them, and find nothing of their Sweetness; yea, though it be in a morning Dew. Bays likewise yield no smell as they grow, Rosemary little, nor Sweet-Marjoram. That, which above all others, yields the sweetest smell in the air, is the Violet, specially the White double Violet, which comes twice a year, about the middle of April, and about Bartholomew-tide. Next to that is the Musk Rose, then the Strawberry Leaves dying with a most excellent Cordial Smell. Then the Flower of the Vines; it is a little Dust, like the Dust of a Bent, which grows upon the Cluster in the first coming forth. Then Sweet-Briar, then Wall-Flowers, which are very delightful to be set under a Parlour, or lower Chamber Window. Then Pinks, especially the Matted Pink, and Clove Gilly-Flower. Then the flowers of the lime tree. Then the Honey-Suckles, so they be somewhat afar off. Of Bean-Flowers I speak not, because they are Field-Flowers. But those which perfume the Air most delightfully, not passed by as the rest, but being Trodden upon and Crushed, are three: that is Burnet, Wild-Time, and Water-Mints. Therefore you are to set whole Alleys of them, to have the Pleasure when you walk or tread."

Then he describes the divisions he deems necessary:

"The Contents ought not well to be under thirty Acres of Ground, and to be divided into three parts; a Green in the entrance, a Heath or Desart in the going forth, and the Garden in the midst, besides Alleys on both side. And I like well, that four Acres of Ground be assigned to the Green, six to the Heath, four and four to either Side, and twelve to the Main Garden. The Green hath two pleasures; the one because nothing is more pleasant to the Eye than Green Grass kept finely shorn; the other because it will give you a fair Alley in the midst, by which you may go in front upon a Stately Hedge, which is to enclose the Garden. But because the Alley will be long, and in great Heat of the Year or Day, you ought not to buy the shade in the Garden, by going in the Sun through the Green; therefore you are, of either Side the Green, to plant a Covert Alley upon Carpenter's Work, about twelve foot in Height, by which you may go in shade into the garden.

"The Garden is best to be Square, Encompassed on all the four Sides, with a Stately Arched Hedge.

"But this Hedge, I intend to be raised upon a Bank, not steep, but gently slope, of some six foot, set all with Flowers. Also I understand, that this Square of the Garden should not be the whole breadth of the Ground, but to leave on either side Ground enough for diversity of Side Alleys unto which the two Covert Alleys of the Green may deliver you, but there must be no Alleys with hedges at either End of this Great Inclosure: not at the Hither End, for letting your Prospect upon this fair Hedge from the Green, nor at the Further End for letting your Prospect from the Hedge through the Arches upon the Heath.

"For the ordering of the Ground within the Great Hedge, I leave it to Variety of Device. Advising nevertheless, that whatsoever form you cast it into; first it be not too busie, or full of Work; wherein I, for my part, do not like Images cut out in Juniper, or other Garden-stuff; they are for Children. Little low Hedges, round like Welts, with some pretty Pyra-

mids, I like well; and in some places, Fair Columns upon Frames of Carpenter's Work. I would also have the Alleys spacious and fair. You may have closer Alleys upon the Side Grounds, but none in the Main Garden.

"I wish also in the very middle a fair Mount, with three Ascents and Alleys, enough for four to walk abreast, which I would have to be perfect Circles, without any Bulwarks or Imbossments, and the whole Mount to be thirty foot high, and some fine Banquetting House, with some Chimneys neatly cast, and without too much Glass.

"For Fountains, they are a Great Beauty and Refreshment, but Pools mar all, and make the Garden unwholesome, and full of Flies and Frogs. Fountains I intend to be of two Natures: the one that sprinkleth or spouteth Water, the other a fair Receipt of Water, of some thirty or forty foot square, but without Fish or Slime, or Mud.

"The main matter is so to convey the Water, as it never stay, either in the Bowls or in the Cistern, that the Water be never by rest discoloured Green, or Red, or the like; or gather any Mossiness or Putrefaction. Besides that, it is to be cleansed every day by the hand, also some steps up to it, and some Fine Pavement about it, doth well. As for the other kind of Fountain, which we may call a Bathing Pool, it may admit much Curiosity and Beauty, wherewith we will not trouble ourselves, as, that the Bottom be finely paved, and with Images, the Sides likewise; and withal embellished with coloured Glass, and such things of Lustre; Encompassed also with fine Rails of low Statua's. But the main point is the same, which we mentioned in the former kind of Fountain, which is, that the Water be in perpetual Motion, fed by a Water higher than the pool, and delivered into it by fair Spouts, and then discharged away under Ground by some Equality of Bores.

"For the Heath, which was the third part of our Plot, I wish it to be framed, as much as may be, to a Natural Wildness. Trees I would have none in it, but some Thickets made only of Sweet-Briar and Honey-Suckle, and some Wild-Vine

amongst; and the Ground set with Violets, Strawberries and Primroses; for these are Sweet, and prosper in the Shade. And these to be in the Heath, here and there, not in any Order. I like also little Heaps, in the Nature of Mole Hills (such as are in Wild-Heaths) to be set, some with Wild Thyme, some with Pinks, some with Germander, that gives a good Flower to the Eye; some with Periwinkle, some with Violets, some with Strawberries, some with Cowslips, some with Daisies, some with Red-Roses, some with Lilium Convallium, some with Sweet-Williams Red, some with Bear's Foot, and the Like Low Flowers, being withall Sweet and Sightly."

"For the Side Grounds, you are to fill them with variety of Alleys, private, to give a full shade, some of them, wheresoever the Sun be. You are to frame some of them, likewise for shelter, that when the winds blow sharp, you may walk as in a gallery. And those Alleys must be likewise hedged at both Ends, to keep out the Wind, and these closer Alleys must be ever finely Gravelled, and no grass, because of going wet. In many of these Alleys likewise, you are to set Fruit Trees of all sorts; as well upon the walls, as in Ranges. And this would be generally observed, that the Borders wherein you plant your Fruit-Trees be fair and large, and low, and not steep, and set with fine Flowers, but thin and sparingly, lest they deceive the trees. At the end of both the side Grounds, I would have a Mount of some pretty Height, leaving the Wall of the Enclosure breast-high to look abroad into the Fields.

"For the Main Garden, I do not deny, but there should be some fair Alleys ranged on both sides with Fruit-Trees, and some pretty Tufts of Fruit-Trees and Arbors with Seats, set in some decent Order; but these to be by no means set too thick; but to leave the Main Garden, so as it be not close, but the Air open and free; for as for Shade I would have you rest upon the Alleys of the Side Grounds, there to walk, if you be disposed, in the Heat of the Year or Day; but to make account, that the Main Garden is for the more temperate parts of the year, and in the Heat of Summer, for the Morning and the Evening, or Over-Cast days.

"So I have made a Plat-form of a Princely Garden, partly by Precept, partly by Drawing, not a Model, but some general Lines of it, and in this I have spared for no Cost."

We have gleaned that in the general arrangement of these old gardens there is almost always consideration for location. There must be groves for shade, fountains and streams for refreshment and enrichment; flowers, both for beauty and odour. Sounds play their part; the music of running and splashing water, the songs of birds, etc. Statues serve to further enrich; views if possible are planned for and broad paths for promenading both in sunshine and shade.

It was these early traditions that shaped and formed the garden period of the Renaissance, and, in its turn, the Renaissance Garden has had much influence on all gardens since.

From our quotations we have gleaned that man through the ages has shown a love of Nature; that he has cared for flower and trees; that he has had pride in ownership of gardens, joy in the beauty of them, and pleasure in the hospitality that he could offer through them; that they have afforded him entertainment as well as provision; and furnished him an endless subject for thought and for philosophizing; and that so have enriched his enjoyment of life.

NOTE.—The lecture from this point was illustrated by many lantern slides made from pictures taken in old gardens and from a few plans of old gardens. It is not possible to convey to the reader by words the impression given by the pictures and plans—and it is with regret that the lecture must be published without them.

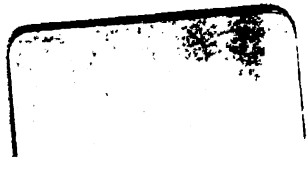
From the pictures we gather something of the charms of old gardens and how man working with nature has led her to answer his needs in pleasant places.

How he has brought into his daily enjoyment those delights of nature that he cannot always go afield to enjoy.

How he has ordered and arranged his sunshine and shadow; how he has made streams to pulsate through many fountains, now throwing jets aloft, now causing falls and cascades, or

making the water to ripple from level to level until collected into quiet basins where it plays the part of doubling the gardens, beauty; how he has made flowers and trees to answer to his pleasure and combined all into a marvellously wrought design and harmony.

And in addition to trying to make more real some of the charms of old gardens, I tried to show that the Garden Artist is not only working with many parts that he must unify and make into a picture, beautiful at all times and from all points of vantage, but that Garden Art is the only art that is not dependent on the skill of the artist alone, but that he is working ever with material that changes from hour to hour and season to season.

"Gardens as if immortal ne'er decay, and fading flowers to fresher, still give way."

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